JUNE 1957
VOL. LII No. 6
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Veterinary Medicine

Established 1905

features in this issue...

Newer Treatments for Helminthic Infections

Relationship Between Water Consumption and Weight Gain in Swine

Survey of Parasitism in Cattle

Application of Glycerin in Veterinary Medicine

Disease Resistance of Garbage Fed Swine

Effects of Surface Active Agents on Paunch Fluid

Infectious Sinusitis of Turkeys

Multiplication of Attenuated Egg-Adapted Distemper Virus in the Vaccinated Host

Nutria: Fur Bearer of the Future

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(Complete Index on Page VIII)

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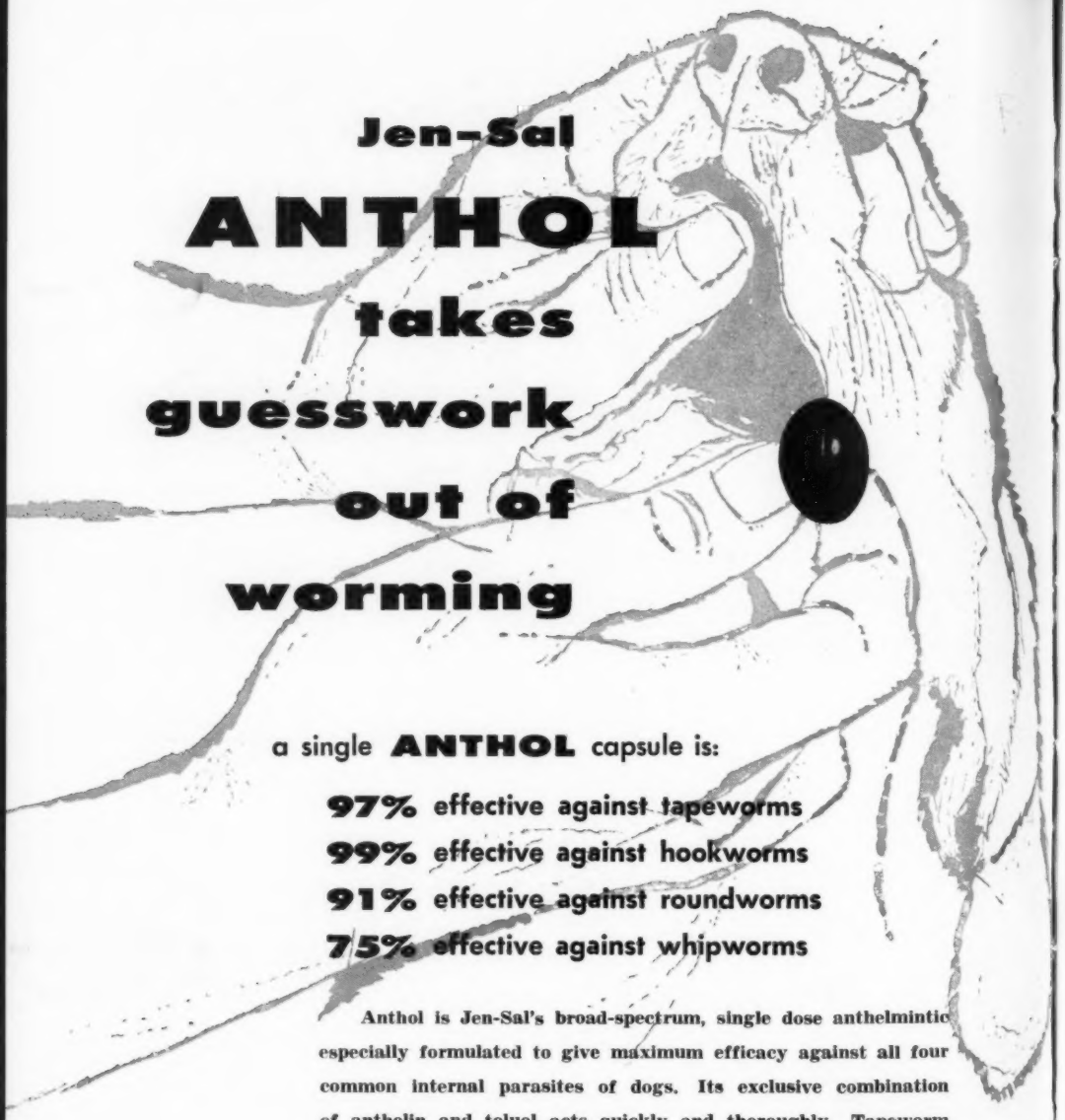

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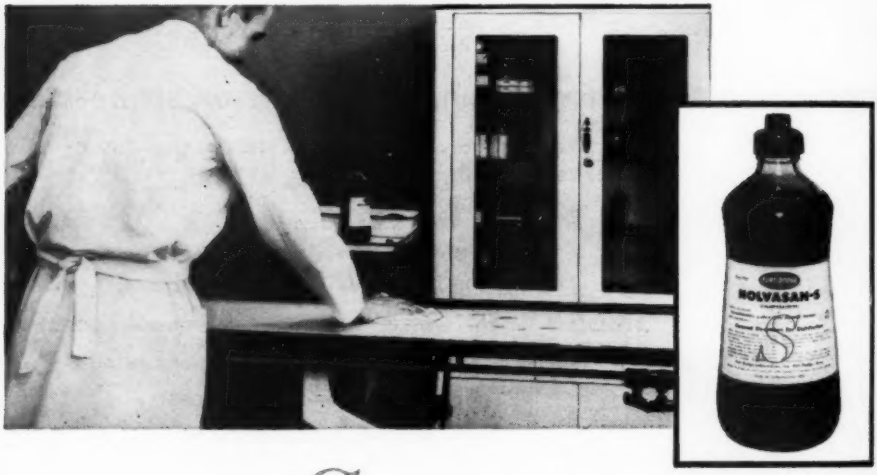

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NEWS COMMENT

Public Relations is Everyone's Business

Twenty-five hundred years ago the street singers of Athens did double duty. As they sang the songs of ancient Greece they also rhymed the praises of Athenian shopkeepers, druggists, and doctors. It was public relations in all its ancient refinement.

Today, no one would expect the veterinary profession to endorse a modern version of these singing commercials. Indeed, in some instances modern abuses have shaken the concept of good public relations. But a good public relations program is essential, and like another good work, it begins at home.

An example of how one veterinarian can stand as a credit to the entire profession is presented in the article, A Dairyman's Best Friend (Hoard's Dairyman, April 10, 1957). "Fortunate, indeed," writes the author, Iowa farmer Melvin Scholl, "is the cowman who has a good veterinarian within a short distance from his farm." He goes on to tell something about Dr. W. W. Cook, whose honest skill and ready talent in the field of dairy health have made him a goodwill ambassador not only for his own practice, but for the profession as well.

Doctor Cook has in this instance given the veterinary medicine public relations story a shot in the arm by simply doing his job. To the man on the street the profession is as good as the local veterinarian. When the local practitioner stands as a credit to his community, friends of the profession will help tell the professional story. When he is indifferent to the impression he makes, his actions are uncomfortably like letting the public stumble across the veterinary story, or not learn of it at all. In the absence of good public relations, countless thousands are sentenced to see the profession only in the light of legend and antiquated memories.

▾ ▾ ▾

Veterinary School for Indiana

The Indiana General Assembly just adjourned appropriated $2,000,000 to begin construction of a School of Veterinary Medicine to be located on the campus of Purdue University.

No details are available regarding plans but the establishment of curriculum in veterinary medicine at Purdue appears to be assured.

VETERINARY Medicine

Established 1905

Registered in U. S. Patent Office

A Monthly Magazine Devoted to the Promotion of the Art and Science of Veterinary Medicine

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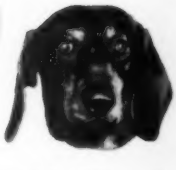

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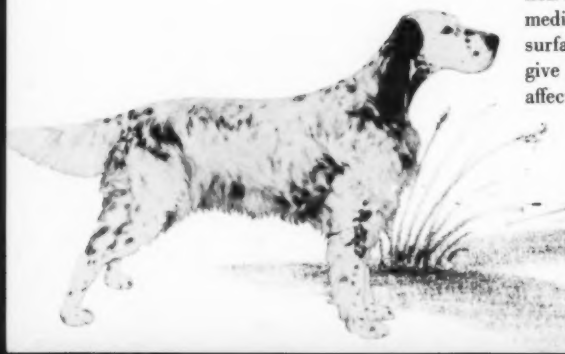

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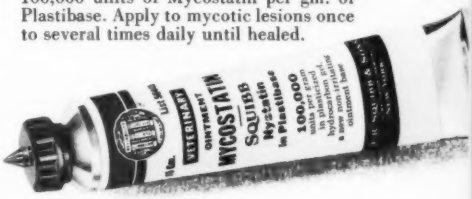

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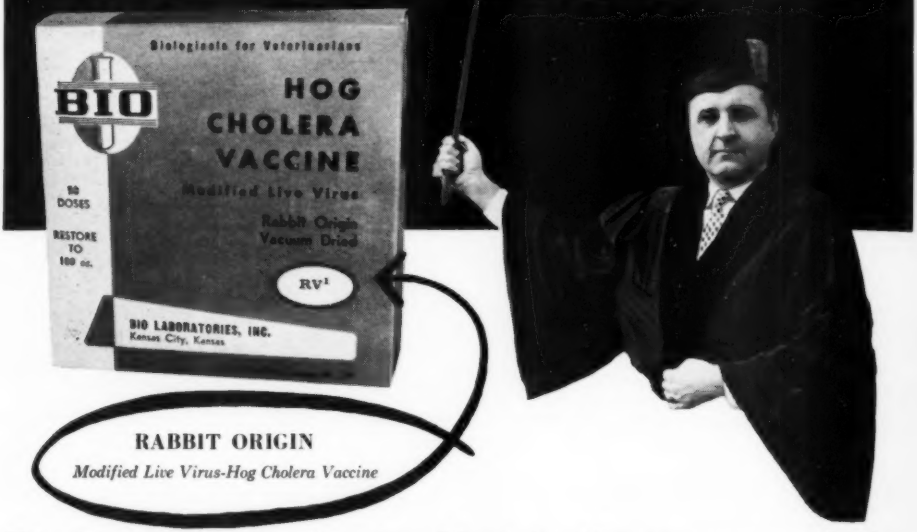

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*Belloff, G. B.: Calif. Vet. 9:16 (Nov.-Dec.) 1956.

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REFERENCES: 1. Mosier, J. E.: Vet. M. 50:605 (Nov.) 1955.
2. Belloff, G. B.: Calif. Vet. 9:27 (Sept.-Oct.) 1956.
3. Pollock, S.: J. Am. Vet. M. Ass. 129:274 (Sept.) 1956.

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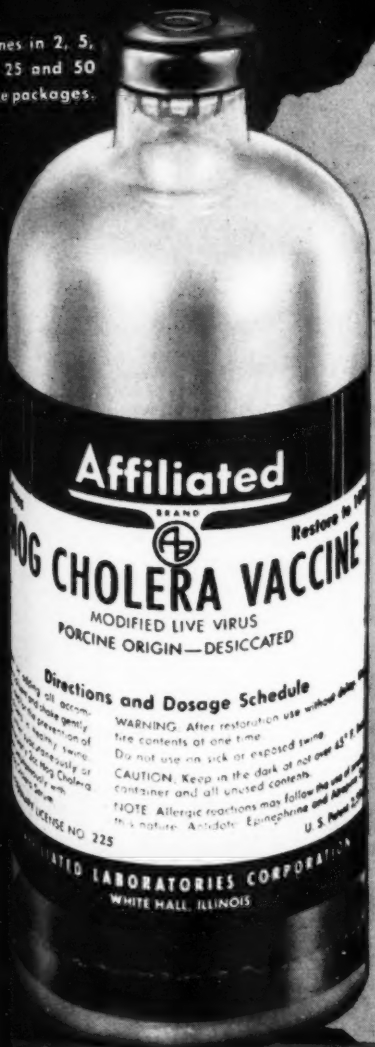
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Q. Should lactating cows be treated with phenothiazine?

A. Generally speaking, not at present . . . because "pheno" can be excreted as a dye in milk, rendering it undesirable for human consumption. However, Wisconsin University experiments indicate that preventive worm control with low levels of phenothiazine may be safe for use on producing dairy animals. Researchers found that cows protected by 2 grams of "pheno" in their daily ration produced milk showing *no* evidence of the drug or its derivatives.* Further research is being carried on in this field and new findings are expected soon.

*University of Wisconsin Bulletin 518, Part I, January, 1956

Q. Why is phenothiazine in salt especially effective for low-level feeding?

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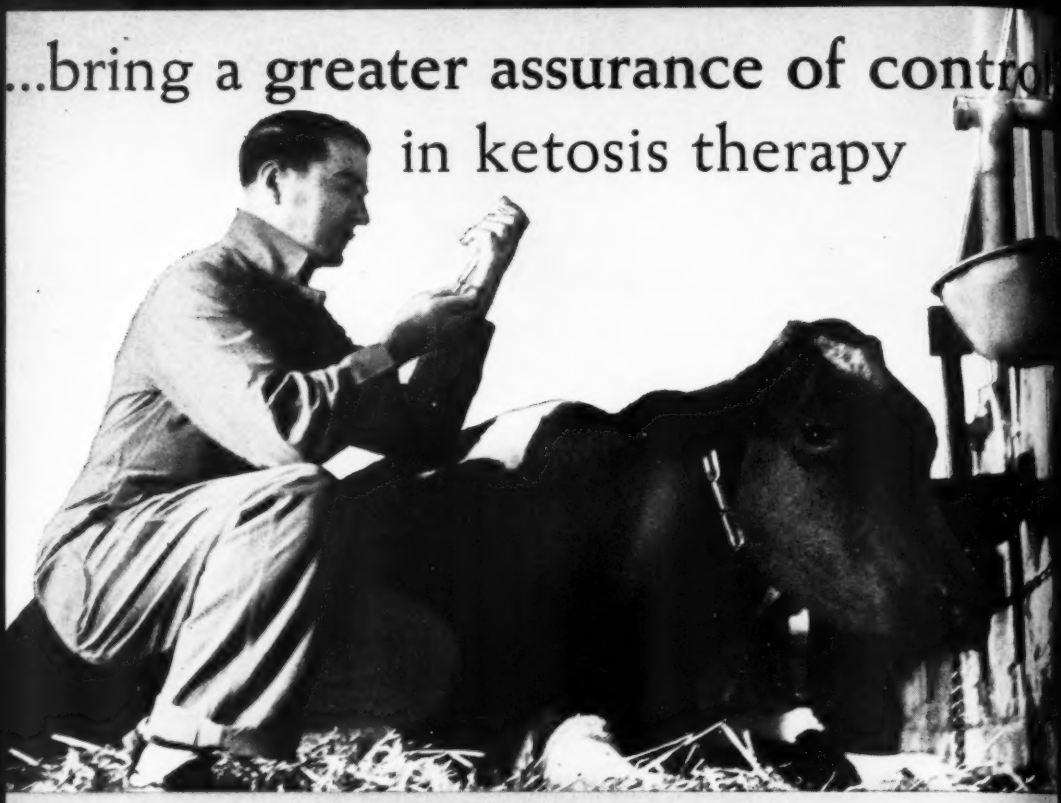

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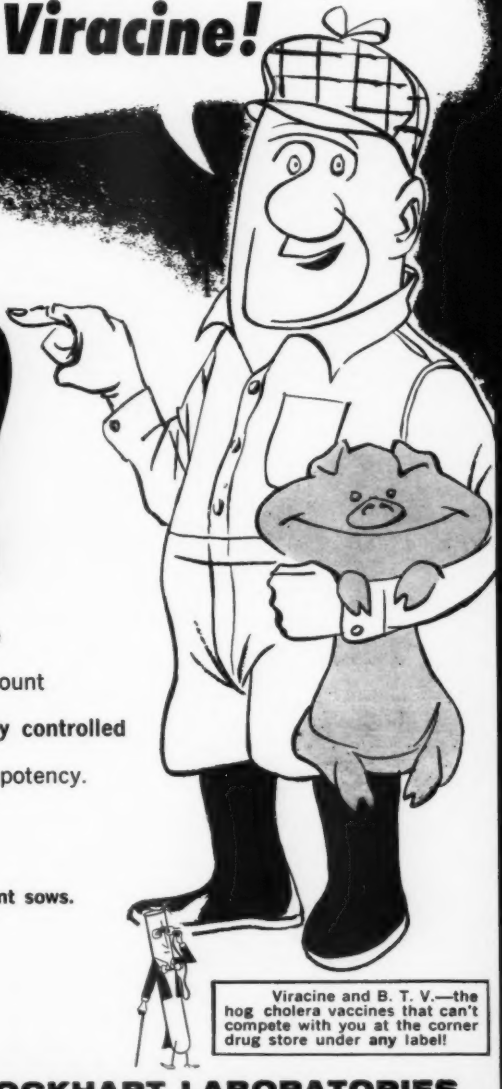

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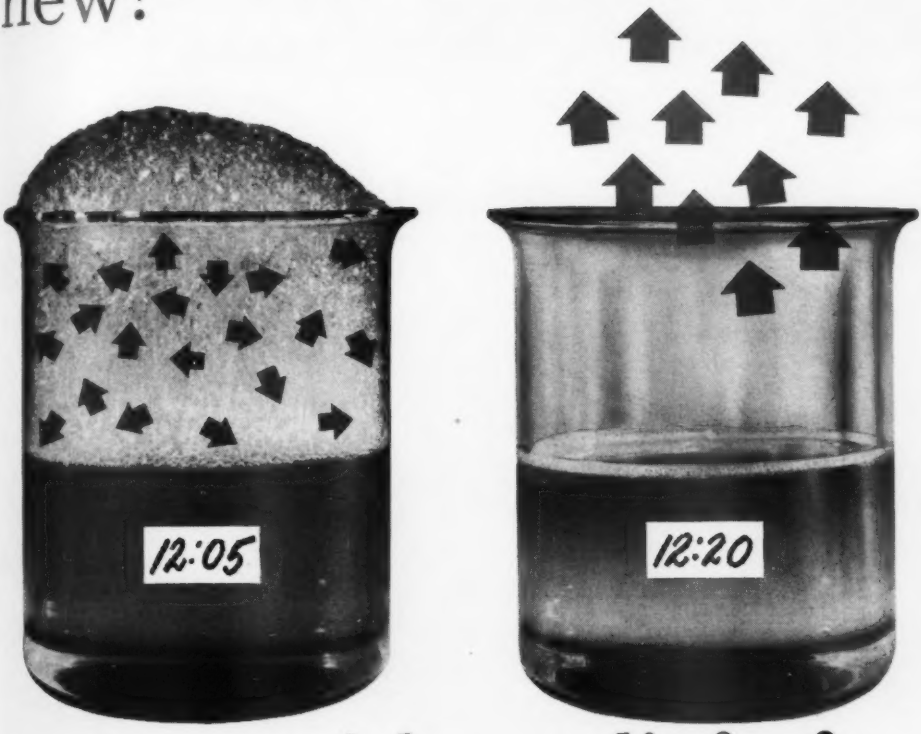

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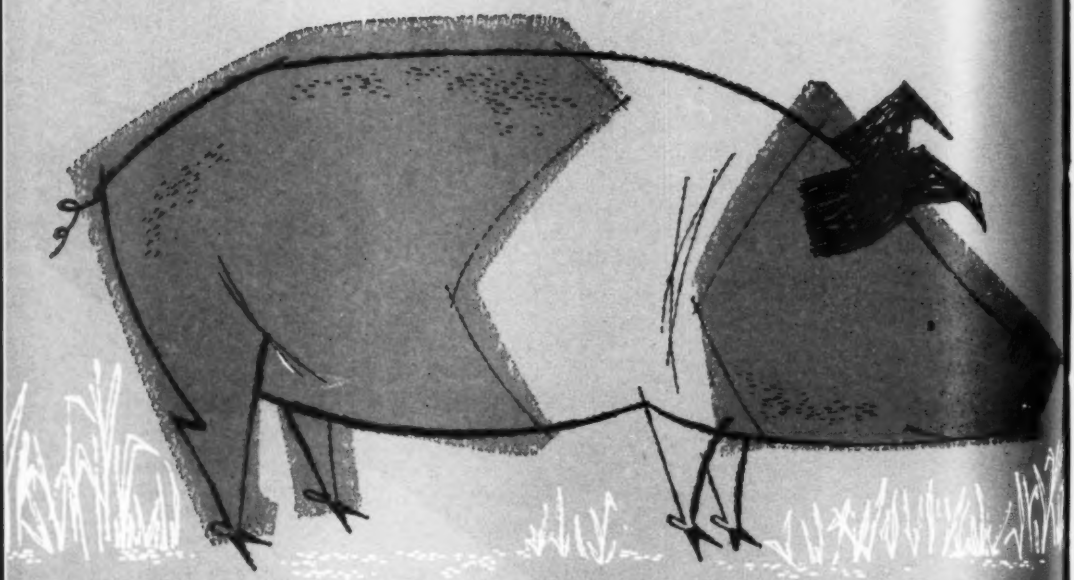

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Newer Treatments For Helminthic Infections†

F. D. ENZIE*, D.V.M., M. L. COLGLAZIER,* B.A., and E. H. WILKENS,* B.S.,
Beltsville, Maryland

PART I

Concept of control of helminthic parasites is undergoing radical change. Not only have significant strides been taken in the development of new agents of improved efficiacy in removing adult forms from hosts, but heretofore unknown weaknesses in metamorphosis have been revealed. Systemic parasiticides also have consumed the attention of parasitologists more completely during most recent years.

The development and use of new chemicals for removal of various stages of the parasite cycle from host animals have provided a fertile field of investigation. Published calculations as to loss in general health, poor production and gains, et cetera, due to parasite loads are probably underestimated although they approach astronomical proportions.

In this article, first of a series to be published in consecutive issues of VETERINARY MEDICINE, the authors present observations of critical tests than becomes a compartive evaluation of various new agents.

CHEMICAL anthelmintic measures are the most powerful weapons presently available against helminth diseases and parasites. The status of specific anthelmintic agents, therefore, requires constant review; and new treatments, which appear with ever-increasing frequency in publications and advertising, should be comparatively evaluated in all respects concerning the usual criteria of safety, efficacy, simplicity, and cost. Particular importance attaches to the method of determining anthelmintic action; for this purpose, the critical test devised by Hall provides the most reliable information. Minor modifications of the test may be necessary in some instances in order to meet special problems that obtain; but, by and large, the fundamentals of the test should not be compromised in the interest of expediency or economy. The critical test, as well as other methods of evaluating anthelmintic efficacy, was reviewed by Moskey and Harwood[1] in 1941.

Essentially, a properly conducted critical test entails the collection of all worms that are passed in the feces of the experimental animal after treatment, and, after the elimination of parasites has ceased, the recovery at autopsy of all specimens that remain in the host. The percentage of efficacy may then be determined by simple arithmetical calculation. In the case of teniacides, autopsy examination of the test animals must be delayed for a period sufficient to permit partial restrobilation of unaffected scolices that may otherwise be overlooked on account of their small size or their location in the deeper recesses of the intestinal mucosa.

It is recognized, of course, that for various reasons (digestion, chemical destruction, ingestion by the host, or oversight) some of the worms removed by the chemical may not be recovered in the feces; yet, the net effect of this

†A revision of a paper presented by the senior author at the Symposium on Helminthic Problems in Veterinary Medicine (1955), School of Veterinary Medicine, University of Pennsylvania.

*Parasite Treatment Section, Animal Disease and Parasite Research Division, Agricultural Research Service, Agricultural Research Center, U. S. Department of Agriculture.

potential source of error is a cautious, conservative interpretation of anthelmintic action rather than a liberal one. Finally, the accuracy of this method of assaying anthelmintic efficacy, as with all testing procedures, is contingent upon adequate data. In this connection, it may be recalled that gastrointestinal helminths are occasionally eliminated for reasons wholly unrelated to anthelmintic medication (age of infection, hyperthermia, overcrowding, immunity reactions, physiological incompatibility such as strain abnormality, dietary factors, terminal cachexia, starvation, etc.); and that variations in efficacy occur, to a greater

Section of small intestine from a Thoroughbred weanling showing several *Parascaris equorum* protruding through a perforation located along the mesenteric attachment. These were associated with the fatal peritonitis.

Parascaris equorum infection in a Thoroughbred weanling. Only a part of the 574 acarids harbored by this animal are shown here.

or lesser degree, among individual subjects in response to any anthelmintic under experimental conditions or otherwise. In short, evaluations of anthelmintic efficacy should be based upon the aggregate data that are well obtained rather than upon fragmentary findings or isolated experience.

It might be well at this point to reflect momentarily upon the usefulness of anthelmintics and of research determinations of their comparative efficiency. Anthelmintics are, of course, indispensable as specific therapeutic agents; but they are especially valuable in the livestock field as adjuncts to parasite control which we elect to define as the employment of feasible measures for the reduction of parasitism and economic loss therefrom. Unless there is a background of information establishing the net superiority of one drug over another, which is determined in part by the critical test, rational and confident employment of anthelmintics can not be achieved.

Although the concept of a "newer" treatment for helminthic infections is rather nebulous, it may be appropriate to consider briefly some of the more recent developments in the use of chemicals for this purpose. In this connection, it may be profitable to consider (a) substances not previously employed in this capacity, (b) extended uses of established anthelmintics, and (c) additional critical data obtained with chemicals of incompletely determined status. The last category involves trials conducted at the Agricultural Research Center with chemicals of reported value and presumably in field use. These investigations are made in pursuance of a long-standing function of the Parasite Treatment Section to evaluate impartially current treatments for helminthic infections without regard to their source or commercial control. The information obtained in this manner is indispensable in answering the numerous inquiries received by the Department regarding the best available treatments for specific helminthic infections. The literature citations are not intended to represent a comprehensive coverage of the specific subjects, but rather to provide a basis for discussion. In most cases the articles cited contain references to other pertinent literature.

Horses

Ascarids. In trials designed primarily to ascertain the tolerance of horses for sodium fluoride, Habermann, Enzie, and Foster[2] found that the chemical exhibited rather marked anthelmintic action in these animals, particularly against the large roundworm, *Parascaris equorum.* The drug was given by various methods, and no attempt was made to establish an optimum dosage. Five years later, however, Todd, Kelley, and Hansen[3] investigated the ascaricidal action of the chemical more thoroughly and reported that a dosage of 2.5 gm. per hundredweight, administered in a drench to horses on full feed, was very effective against both mature and immature ascarids in ten horses. Animals were autopsied 24 hours after treatment, and it was determined that 99.8% of 1,156 worms had been expelled from the small

Third stage larva of the *Strongylus vulgaris*, enlarged 177 times, from a blade of grass.

intestine. A dosage of 1.5 gm. per hundredweight, however, removed only 61% of 811 ascarids from the small intestine of a similar group of horses. Moderate to severe diarrhea, moderate gastroenteritis, hemoconcentration, leucocytosis, and hemolysis were observed following treatment.

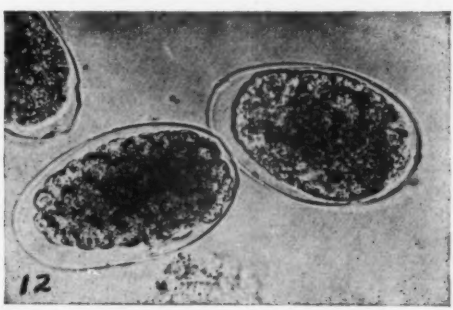
Toluene, or methylbenzene, exhibited effective action against the large roundworm in trials by Todd and Brown[4] in 1952. A dosage of 20 cc. per hundredweight, administered to animals on full feed, removed 99% of 420 ascarids from eight horses. Limited data obtained by Sinclair and Enzie[5] suggest, however, that a dosage of 10 cc. per hundredweight may be adequate when the chemical is administered after an appropriate fast. Following field trials in 1955 with 454 animals, Smith[6] concluded that toluene was the ascaricide of choice for young horses. The chemical was administered by stomach tube at the rate of 20 cc. per hundredweight and was given without interruption of regular feeding practices. Many of the animals, including sucklings, weanlings, and yearlings, were given the drug on more than one occasion as part of a routine parasite control program. The only indication of toxicity was noted in one yearling filly that exhibited transient incoordination about 30 minutes after treatment. There were no indications of colic, however, and all symptoms disappeared within two hours. Moreover, one brood mare that received approximately three times the dosage

Left, fourth stage larvae of the Strongylus vulgaris, natural size, from an aneurysm in an artery. Right, mature worms, natural size, from the intestine.

recommended for unfasted animals showed only transient symptoms of colic and delivered a normal foal three months after treatment.

Toluene is equally effective against both mature and immature ascarids but is ineffective against strongyles. It may be noteworthy that the drug has exhibited limited action also against bots. The chemical is apparently well tolerated by horses, and it is especially pertinent that it does not produce the severe gastritis and sloughing of the mucosa that is commonly associated with the carbon disulfide treatment.

Miscellaneous Parasites. Piperazine adipate showed promise of effective anthelmintic action against ascarids, pinworms, and small strongyles



Ova of *Strongylus vulgaris*. Enlarged 100 times (left); 400 times (right).

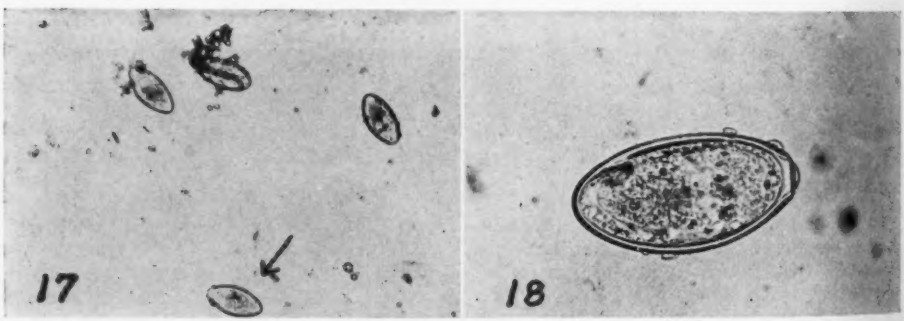
Verminous aneurysm in a branch of the anterior mesenteric artery. Note the marked thickening of the arterial wall, and the immature *Strongylus vulgaris* in the thrombus formation.

of horses in trials reported by Sloan, Kingsbury, and Jolly[7] in 1954. Six yearling ponies were given the drug by various methods in dosages of 250 to 400 mg. per kilogram of body weight followed by massive doses of 1,250 to 1,500 mg. per kilogram one week later. There were no indications of toxicity associated with any of the dosages employed. The animals were not autopsied, but efficacy was determined from the recovery of worms and the reduction of egg counts after medication. A dosage of 400 mg. per kilogram of body weight was apparently completely effective against 51 large roundworms in three horses. Marked ascaricidal action was exhibited also in two young zebras that were given a dosage of about 300 mg. per kilogram of body weight. These animals expelled over 175 worms, mature and immature, but apparently no attempt was made to estimate the efficacy of the treatment by egg counts or subsequent massive doses of the drug.

Anthelmintic action was also exhibited against pinworms, *Oxyuris equi*, and small strongyles, Trichonema spp. Apparently all of 211 mature female Oxyuris were removed from two horses that were given 400 mg. per kilogram, but males and larval stages were more resistant. Insofar as small strongyles are concerned, these investigators indicated that on the basis of numbers of worms expelled and diminished post-treatment egg counts a minimum efficacy of 85% could be expected with a dosage of 400 mg. per kilogram of body weight.

Subsequent findings by Poynter[8,9] and by Downing, Kingsbury, and Sloan[10] indicate that piperazine adipate is effective against adult Trichonema spp. and against mature and immature ascarids when given at a dose rate of 10 gm. per hundredweight. This dosage is partially effective against *Strongylus vulgaris*, but it has little or no action against *S. edentatus* and *S. equinus*. The drug may be given in the feed or by stomach tube, and no preliminary fasting or subsequent purgation is necessary. Moreover, the chemical appears to be unusually well tolerated by horses, even in dosages considerably larger than necessary to obtain effective anthelmintic action.

In 1956, Poynter[11,12] reported that piperazine-1-carbodithioic acid exhibited marked action against ascarids and small strongyles of horses but showed negligible effect on Strongylus spp. Moreover, there was the suggestion of possible action also against stomach bots although the findings were inconclusive. In this connection, some concern was indicated over the possible increase in numbers of Gasterophilus spp. in consequence of the replacement of carbon disulfide by piperazine derivatives in the treatment of ascariasis of foals. Critical tests with piperazine adipate[9,10] have shown that the chemical has no effect on stomach bot larvae in the equine stomach. Poynter[11] found no demonstrable differences



Microscopic view of ova of *Oxyuris equorum*, the pinworm or rectal worm of the horse (left) magnified 100 times. The same ova magnified 400 times (right). Note the operculum or cap at one end of the shell.

in anthelmintic efficiency of piperazine adipate, citrate, phosphate, and carbodithioic acid when given to horses in dosages of comparable piperazine content.

Gandal[13] reported marked ascaricidal action in 13 captive zebras that were given piperazine adipate in doses of 25 to 90 gm. each. Large numbers of worms were eliminated in the feces of all animals after treatment, and subsequent fecal examinations showed that ascarid egg counts were substantially reduced. The chemical was well tolerated in all respects.

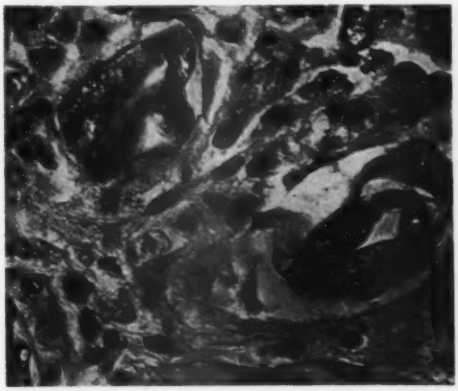
Abdominal Worms. In limited trials in Japan, Shoho[14] reported that diethylcarbamazine showed considerable promise in controlling *Setaria digitata,* the migrating larvae of which produce epizootic cerebrospinal nematodiasis ("Kumri") of horses. Dosages of 10 to 80 mg. per kilogram of body weight, given daily for two to five days, appeared to be effective in two foals. Nervous symptoms, including incoordination and posterior paralysis, generally disappeared within a few days; and there were no unfavorable reactions attributable to the drug. Comparable success was not achieved by Pillai and Seneviratna,[15] however, in a mature Thoroughbred mare that received three doses of about 80 mg. per kilogram of body weight.

Cattle

Ascarids. In limited trials by Lee[16] in 1955, all the ascarids, *Neoascaris vitulorum,* were removed from two calves that were given piperazine adipate in a drench at the rate of 1 gm. per 10 pounds of body weight. The drug was effective against both mature and immature worms but had no effect on the development of eggs. In 11 additional calves, dosages of 1 or 2 gm. per 10 pounds of body weight resulted in the removal of numerous worms and a complete disappearance of ascarid eggs from the feces. The chemical was well tolerated in all cases; and in specific toxicity trials, no unfavorable reactions were observed in animals that received dosages of 10 to 30 gm. per hundredweight.

Miscellaneous Parasites. The feasibility of low-level phenothiazine therapy for the control of gastrointestinal nematodes of cattle has been demonstrated by Andrews, Muniz, and Orihuela,[17] Mayhew,[18] Cauthen,[19] and others. These workers demonstrated that the net effect of the regimen, namely, reduced pasture contamination with infective larvae, results, at least in part, from lowered egg production, interference with embryonation, and a delayed lethal effect on the adult worms. Moreover, trials with sheep at the Agricultural Research Center[20] indicate that the beneficial effects of low-level medication with phenothiazine may be ascribable also to the destruction of preinfective larvae and to an interference with the establishment of new infections in the host. By and large, the regimen appears to be most effective against Haemonchus, Bunostomum, and Oesophagostomum; somewhat less effective against Trichostrongylus and Ostertagia; and without significant effect on Cooperia and Strongyloides. The influence of the regimen on Nematodirus infections in cattle has not been adequately established, but in studies by Turner and Colglazier[21,22] excellent control of this nematode was obtained in sheep with a 1:9 mixture of phenothiazine and salt.

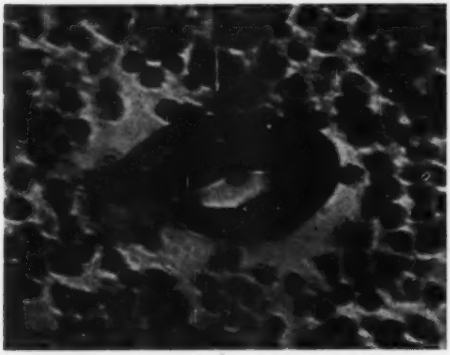
Increased interest in the low-level regimen for cattle was aroused by the report of Brock, Pearson, and Kliewer[23] in 1952 which indicated that the regimen was effective in controlling the lungworm, *Dictyocaulus viviparus.* In a herd of 500 calves losses from lungworms ceased when the animals were started on a regimen of 2 gm. of phenothiazine daily per calf. Approximately half of the herd was moved to clean pasture every ten days, but both groups responded equally well to the regimen.



Larval forms of lungworm in caseous nodules (cattle).

An insight to the possible mode of action of the chemical in the control of lungworm infections was suggested by the results of a preliminary experiment conducted at the Agricultural Research Center. In a single trial a calf was infected experimentally with lungworms and started on a low-level regimen a few days after patency was established. Larval counts obtained at various intervals during the experimental period by the Baermann technic

showed no apparent reduction in the numbers of larvae, but few of them developed to the infective stage. Larvae obtained from a calf that was not exposed to the drug developed normally. Moreover, Jarrett, McIntyre, and Urquhart,[24] in 1954, reported that phenothiazine given orally or intratracheally was lethal to first-stage lungworm larvae either in their passage through the gut or within a few days after their elimination in the feces. In one two-year-old heifer that was passing 1,000 larvae per gram of feces, an oral dose of 15 gm. was sufficient to kill almost all of the larvae for several days although there was no apparent reduction in the numbers of larvae in the feces. These findings with respect to the apparent mode of action of the drug in lungworm infections are particularly noteworthy in view of the report by Dennis, Swanson, and Stone[25] that low-level phenothiazine had no effect on *D. viviparus* in Florida cattle, presumably because there was no reduction in numbers of larvae in the feces. It may be added parenthetically that preliminary findings by Jarrett, Jennings, McIntyre, Mulligan, and Urquhart[26] and by Rubin and Weber[27] show promise of eventual control of lungworm infections in cattle by immunological methods.



Dictyocaulus viviparus (lungworm) in terminal bronchi.

One of the principal obstacles to the wide-scale employment of the low-level regimen is the lack of a practical and reliable method of assuring adequate consumption of the drug. As noted by Foster,[28,29] the dosage prevailing in successful applications of the regimen in the control of gastrointestinal nematodes of cattle has been approximately 0.5 gm. of phenothiazine daily per 100 pounds of body weight up to a total dose of 2 to 5 gm. per head daily for animals over 500 pounds. From the standpoint of practical usage, however, there appears to be little justification or indication for dosages larger than 2 gm. per head daily. Adequate dosages have obtained in some instances when the chemical was incorporated in salt or various mineral mixtures, but these methods have not been uniformly applicable. The reasons for occasional failure have not been definitely established, although diet, availability of minerals from natural sources, and variations in the individual requirements for these materials are possible factors. Nevertheless, Harwood, Guthrie, and Preble[30] in Ohio and Herlich and Porter[31] in Alabama obtained good control with mixtures containing 10% phenothiazine in loose salt and mineral mixture, respectively. Moreover, 5% phenothiazine in a mineral supplement showed promise of effective action in trials conducted at the Agricultural Research Center[32] in Maryland. On the other hand, the low-level regimen was ineffective in trials reported by Britton and coworkers[33,34] in California largely because of inadequate consumption of the mixtures. These findings suggest the need for determining the proper vehicle and suitable concentration of the drug in the specific areas of use. In this connection, pelleted feeds containing appropriate concentrations of the chemical, and commercially-flavored brands of the drug, show promise of affording effective means of assuring adequate consumption of the chemical.

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Isolation of a Causal Agent of an Avian Hepatitis†

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During the Fall of 1956, an infectious agent was isolated from a Rhode Island Red breeding flock in Massachusetts. The agent was shown to cause a primary hepatitis in chickens.

Twenty-one hundred eight-month-old pullets were maintained in a three-story laying house, which was divided into nine pens. Egg production attained a peak of about 80% and then varied between 75 and 80% during the season. At the time of housing, approximately 80 birds were removed as culls. No clinical signs of illness were seen; however, on weekly examination of the flock, approximately one to four pullets "going light" and obviously out of production were removed from each pen. Three groups of affected birds were studied in the laboratory.

In addition, 10,000 pullets, 18 weeks of age, were being reared on range on the same farm about 300 yards from the laying house. Although clinical evidence of disease was not striking, selection of one or more cull birds from each range shelter was not difficult. Two groups of these chickens were also examined in the laboratory.

On necropsy the most striking feature of the disease was the degenerative changes in the liver. There was variability in the severity and extent of lesions from bird to bird or even from lobe to lobe within a given liver. Some of the livers were slightly enlarged and mahogany-brown but otherwise had no gross lesions. Other livers had pin-head size, grayish-white, necrotic foci particularly along the lobar edges. More severely affected livers were friable and had irregularly round (cauliflower-like) necrotic areas up to 1 cm. in diameter distributed throughout the organ. On cut surface these necrotic foci appeared interconnected by cords

†Contribution no. 1093 of the Agricultural Experiment Station, University of Massachusetts.

of degenerating cells. Ascites and hydropericardium were observed only in the most advanced cases.

In mild or early infections lymphocytic foci, sometimes containing a few heterophils, were seen most often around the portal triads. Congestion and fatty metamorphosis often were observed. In more severe cases, lymphocytic and granulocytic foci and focal degeneration were the predominant changes. The areas of degeneration, which were irregular in size and shape, did not bear consistent relationship to lobular structure. In an occasional liver there were granulomatous areas with fibrinoid necrosis. The liver capsules were sometimes thickened. Tudor[1] has described a similar condition in single-comb White Leghorn chickens.

Livers were cultured for aerobic and anaerobic bacterial pathogens. These findings were negative. Also at the time of necropsy, affected livers were seared and then stabbed with sterile cotton swabs. Each of the swabs was placed in 1.5 ml. of sterile saline. Within the same day, saline suspensions of suspect material were inoculated into six-day-old embryonated chicken eggs *via* the yolk sac using 0.1 ml. of the inoculum per egg. Where positive isolations were made, embryos usually died on the fourth and fifth day postinoculation and exhibited congestion and subcutaneous hemorrhage. Nine of 19 birds cultured in this manner yielded the agent. Harvested yolk material from embryo mortalities proved negative for bacterial agents on blood and chicken infusion agar and in thioglycollate medium. PPLO broth and agar (Difco) inoculations were also negative. At the second and on subsequent serial passages (ten to date) embryos usually died on the third and fourth day. When the agent was propagated serially (ten passages) in the allantoic cavity of ten-day-old embryos, deaths were generally delayed, however, until five or more days postinoculation. Greatly enlarged livers with congestion and focal degeneration were noted at this time.

Day-old chicks were inoculated with embryo-infective yolk material by the oral, intramuscular, and intraperitoneal routes. These birds had enlarged livers with degenerative foci as early as five to ten days postinoculation. The pericardial sac was sometimes filled with and distended by straw-colored fluid. The heart muscle was flabby and bleached. Microscopic lesions of the liver were similar to, but less severe than, those observed in mature birds. The myocardium was edematous and infiltrated by mononuclear cells. Many of the myocardial fibers were atrophied. In addition, chickens 3½ weeks of age were inoculated with the same agent by oral, intravenous, and subcutaneous (foot-pad) routes. Ten days after inoculation, those birds given the agent orally and intravenously had gross lesions of hepatitis. The agent was isolated again from livers of all groups except the control birds, which remained negative.

Preliminary studies using embryos for assays indicate that this agent, or strain of agent, is sensitive to chlortetracycline, oxytetracycline, magnamycin and dihydrostreptomycin sulfate. Polymyxin B sulfate, bacitracin and chloramphenicol had little or no effect, but penicillin G potassium showed some inhibitory action.

The agent isolated from this flock possesses characteristics that are in several respects similar to the agent isolated and described by Delaplane *et al.*[2] as also causing an avian hepatitis. However, many dissimilarities exist between this disease and that described by Lukas.[3] The incidence and economic importance of the etiologic agent remains to be established. More recently, an agent with similar characteristics has been isolated from affected birds in a flock of 1,000 White Rock pullets, 24 weeks of age.

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Of the 1,284 cases of equine enchphalomyelitis reported in the United States during calendar year 1956, 493 terminated fatally. Type of laboratory confirmed cases indicated that approximately equal numbers of animals were affected with the western and eastern types.

Seasonal incidence was emphasized in the report by the Special Disease Eradication Section in the tabulation indicating that 1,163 (or 90%) of the total number of infected animals sickened between June and October.

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New technic for the attenuation of disease producing agents promise guides for the development of prophylactic agents for any and all infectious diseases of animals.

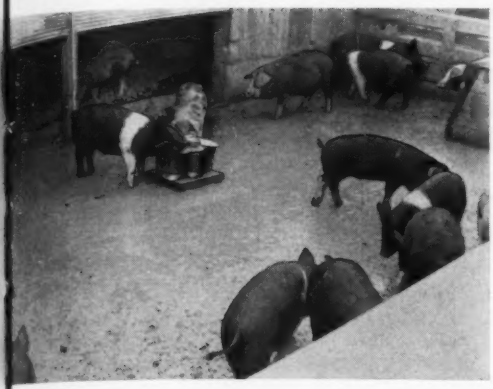

Fig. 1. Illustrating watering facilities for 180 feeder pigs prior to experiment. One drinking space was provided for 90 hogs.

A Report On The Relationship Between Water Consumption And Weight Gains In Swine

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IT may be stated as a defensible generalization that pork production is unexcelled for the ease with which the rank innovator can become entangled in subtle pitfalls. Fortunately the author of proposals that diverge sharply from currently accepted practices in swine production has the advantage, if he is a non-professional, for if the scheme falls through, the danger to his personal life is less. With this bright, optomistic point of view, Mr. Milt Bowman, a grain belt stock farmer, tested some common observations that seemingly established a continuing relationship between water consumption and pork production.

The purpose of this report is to set forth the practical operating details of that experiment, and to draw the proper conclusions.

The Problem

This field investigation was prompted by a growing realization that sub-standard consumption of water by swine is largely the result of conditioning at an early age. Watering spaces continue to be limited on most farms, not because swine require less water, but because these animals easily adapt to existing supplies. Both Mr. Bowman and veterinarians with whom he discussed the matter had noted that hogs seldom fight for water; that after being rooted away and discouraged from having the opportunity to drink, the average pig finds it easier to do without adequate water than to fight for it. Careful observation of hog habits over a long period has pointed up this peculiar anomaly.

It was also observed that in any group of hogs, a modest percentage become "bullies." The "bully" hogs intimidate meeker animals; as a result as high as 80% of almost any group refuse to eat or drink whenever a "bully" hog is near a drinking bowl or feeding lid. Limitation on drinking spaces or feeding lids allows the more dominant pigs to rule the majority and actually limit drinking and feeding time.

Staley Mills research scientists have demonstrated that swine 25% deficient in water consumption require 25% more feed per pound of gain than animals consuming a normal amount of water. Studies have also revealed

TABLE 1. Pounds and Cost of Feed Consumed

	Supplement		Shelled Corn		Ground Feed	
	Amt. lb.	$ Cost	Amt. lb.	$ Cost	Amt. lb.	$ Cost
Controls	1,800	90.	21,374	491.60	2,833	84.99
Test Group	1,800	90.	16,870	387.91	3,741	136.62

Supplement in both groups is the same. It was hand fed approximately the first half of the experiment. Later ground feed was used.

that the average hog going to market shows a water content in pork tissue of about 53%. The national average, unfortunately, indicates that the water content in pork tissue is far below the optimum level. An adequate supply of drinking water for swine should raise the water content in pork tissue to approximately 58%. A swine grower can sell an extra ten pounds of pork and also assure the consumer of better flavor and a more tender cut of meat by supplying his pigs with a sufficient number of watering places.

The savings in feed costs per hog by market time have been calculated to be $3. to $4. per hog.

Methods and Materials

In testing these calculations and observations, a group of approximately 180 feeder pigs was divided into two water groups. The entire group had been purchased in the South. At the time of the experiment, all animals were running on a feeding floor and had access to two watering bowls (fig. 1).

All hogs were gate sorted and weighed at the beginning of the experiment. One group, used as controls, weighed an average of 109.9 lb. per hog. The controls were maintained on the feeding floor with only one drinking bowl, or an average of one drinking space for 89 pigs. This is close to the national average of one drinking fountain per 90 hogs, and had been previously the average for hogs raised on the Bowman farm.

The second group of 88 hogs averaged 102.7 lb. each at the beginning of the experiment. A six-drink hog bar *(fig.2) provided drinking spaces at a ratio of over one for every 20 swine. The increased ratio allowed the swine more time and space in which to drink, and also provided a more adequate supply of fresh, clear water. Otherwise the two groups were managed and fed identically.

At the end of a 30-day period animals from both groups were weighed. The test group in the pen with the six-place fountain not only ate less feed, but at the same time gained more weight, and also exhibited fewer symptoms of intestinal disorders. Feed cost for this group per pound weight gained was 9.9 cents. The control group had an average feed cost of 11.6 cents per pound weight gained. (See table 2.)

The Time Factor

Basic computations will illustrate that one drinking space can not serve the national average of 90 to 100 hogs. The following facts will provide the basic data for computation, and will illustrate that the time factor plays an important part in determining the number of drinking bowls per herd.

1. A hog must drink one gallon of water for every pound of pork produced.

2. Two gallons of water are required for two pounds of daily gain in body weight.

3. The average hog drinks approximately one pint of water in one trip to the water fountain. Each trip requires approximately 30 seconds.

4. To consume 16 pints of water (two gallons) it would take 16 trips to the drinking fountain. With each trip consuming conservatively 30 seconds, each hog requires eight minutes at the drinking fountain each day.

5. With 90 hogs in a pen having access to only one drinking space, 720 minutes total drinking time are required (8 x 90) if all hogs are to consume the necessary two gallons of water.

*Ranger Equipment, Delphi, Ind.; Altamont, Ks.; Cedar Falls, Ia.

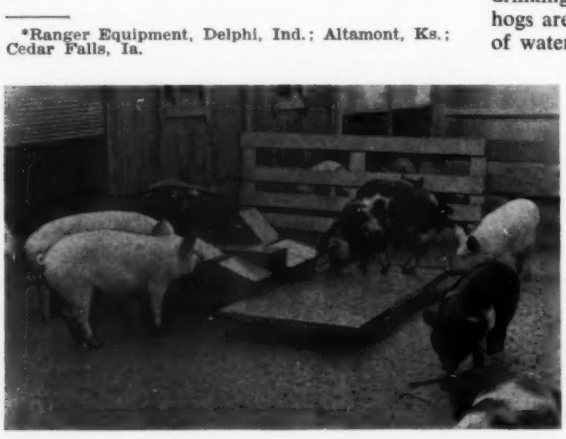

Fig. 2. Six-drink hog bar used for test group. One drinking space was provided for every 20 hogs.

TABLE 2. Weight Gains of Hogs

	Beginning Experiment			End Experiment		
	No. hogs	Total lb.	Avg. lb.	No. hogs	Total lb.	Gain lb.
Controls	89	9,788	109.9	89	15,513	64.4
Test Group	88	9,024	102.7	88	15,193	69.9

Total feed cost of control group: $666.99; cost per lb. gain: 11.6 cents.
Total feed cost of test group: $614.53; cost per lb. gain: 9.9 cents.

6. This means that 12 hours are required even if all hogs stand in line and drink the required amount of water with little or no loss of motion. In short, all the daylight hours of most days in the year will not provide enough time for proper water consumption when pigs are maintained with one drinking place for 90 animals.

It may be noted, however, that one drinking fountain for every 20 hogs, enough time and water are available to allow all hogs to consume the two gallons necessary for two pounds daily weight gain.

Summary

An adequate supply of drinking water for hogs was found to give the following advantages:

1. More rapid gain to market weight.
2. Less feed cost per 100 lb. gain.
3. Marked decrease in general intestinal disturbances.

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Survey of Parasitism in Cattle

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This survey was conducted in the winter of 1956-1957. Fecal samples were collected from cattle in Illinois, eastern Iowa and northeastern Missouri. These samples were collected primarily from beef cattle which were going to fatten in the feed lot or were already on full feed.

The following technic was used for examination of samples:

1. Mix approximately 2 gm. or feces with approximately 20 cc. of saturated solution of potassium nitrate using a waxed paper cup and a wooden tongue depressor.
2. Strain through clean cheesecloth.
3. Fill a test tube with this suspension to within 1 to 2 cm. of top.
4. Place in centrifuge and run for three minutes.
5. Remove from centrifuge and fill with saturated solution of potassium nitrate until the fluid wells up at the rim.
6. Place a cover glass across top of tube. The fluid should be in contact with the cover glass.
7. Allow the test tube to remain in vertical position for three minutes.
8. Remove the cover glass and place, fluid side down, on a slide.
9. Proceed with microscopic examination.

This is a modification of technic described by Coffin*.

No attempt was made to differentiate the different species of helminths. Incidence of coccidia was noted. The samples were classified as negative, light infestation, moderate infestation, and heavy infestation.

A negative sample indicated no parasitic eggs were found.

A light infestation indicated only a few scattered parasitic eggs were found on the whole slide.

A moderate infestation indicated a few parasitic eggs were found on each microscopic field.

A heavy infestation indicated numerous parasitic eggs on each microscopic field.

Four hundred and forty herd samples were checked for parasites. These herds consisted of approximately 25,000 cattle. Two hundred and sixty four (60%) were classified as a light infestation; 94 (21.4%) as moderate infestation; 37 (8.4%) as a heavy infestation, and 45 (10.2%) as negative. Coccidia were found in 27 (6.1%) of the samples examined.

Tabulation of Findings Examination of 440 Fecal Sample

Degree Infection	Samples no.	Sample %
Light	264	60
Moderate	94	21.4
Heavy	37	8.4
Negative	45	10.2
Coccidia	27	6.1

* *Coffin, David L., Manual of Veterinary Clinical Pathology. Comstock Publ. Co., Ithaca, N. Y., 1945.

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If we make progress we must study the phenomena in nature governing all living things.

Application Of Glycerin In Veterinary Medicine

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GLYCERIN is one of the most valuable products known to pharmacy. As a solvent and an antiseptic, it is scarcely inferior to alcohol. Owing to its hygroscopicity, glycerin is useful in keeping substances moist. It is a valuable emollient in many skin diseases, and its agreeable taste and non-poisonous properties make it suitable for many purposes.

Chemistry

Glycerin is 1,2,3-propanetriol, chemically the simplest trihydric alcohol. One, two or all of its hydroxyls can react. Moreover, since the two terminal alcohol groups are primary, whereas the middle one is secondary, the compound is capable of yielding both an aldose (glyceraldehyde) and a ketose (dihydroxyacetone). Hence it can be seen that an unusually large number and variety of derivatives can be formed. Of these the most important industrial class is esters, although other derivatives such as glyceroxides, thioglycerines, acetals, and amines have valuable uses.

Glycerin is a clear, colorless, syrupy liquid which has a sweet taste. It is miscible with water and with alcohol. It is insoluble in chloroform, ether, and fixed, or volatile oils.

Source

Methods of producing and refining glycerin have steadily improved since it was discovered in 1779 by Karl Wilhelm Scheele, the famous Swedish chemist. Currently, principal sources of glycerin are animal and vegetable fats and oils and propylene, the latter a by-product of petroleum refining. It can also be produced from the fermentation of carbohydrates, although the latter process is rarely employed.

About two-thirds of the glycerin produced in this country comes from the processing of fats and oils in connection with the making of soap or the hydrolysis of fats during the production of fatty acids. Production of glycerin on a commercial scale by the synthetic method, starting with the chlorination of propylene, began in 1948 and now accounts for an estimated one-third of the supply available for industrial uses. Glycerin originating either from fats or propylene is now offered meeting U.S.P. specifications.

Pharmacology

For a review of the pharmacological actions of glycerin, the reader is referred to the work of Deichmann.[1]

Glycerin is readily absorbed when administered *per os*, but absorption from the intact skin is negligible. After absorption, a variable amount is lost by way of the urine and the rest is metabolized in the same manner as, but more slowly than, the carbohydrates. The amount in the urine increases with the size of the dose and is greater after intravenous injection than when it is given orally. In man, after oral doses of 200 gm., as much as 50 gm. may be recovered from the urine, while after doses of 2 or 3 gm., only traces may be found. Excretion is complete by the end of six hours. Feeding glycerin will elevate the liver glycogen of starved animals and will slowly counteract the blood-sugar-lowering action of insulin.

Rosenau has made an extensive and interesting investigation as to the value of glycerin as a disinfectant. His findings are that a glycerin preparation of 50% concentration will restrain all bacterial growth. Weaker solutions fail to show this marked effect. Use is made of this property in the preparation of modified smallpox vaccine, which contains 50% glycerin. Other products, particularly serum preparations used as reagents, in the biological laboratory are similarly preserved.[2]

Uses

The uses of glycerin in veterinary medicine are legion. It is used as a solvent, humectant, plasticizer, emollient, sweetener, in liquid soaps, and often in fermentation nutrients in the production of antibiotics.

Recently, it has become valuable to workers in artificial insemination. It has been found that *Trichomonas fetus* can be eliminated from infected semen by storing overnight at 5 C. in 20% glycerin, or preferably by freezing to -79 C. in the presence of 10% glycerin.[3]

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Holt[4] found that the addition of glycerin to buffered, diluted bull semen to a concentration of 10% resulted in an increase in conception rate.

Another related use of glycerin of interest is in preserving semen at low temperatures.[5,6] When bull semen is frozen at -79 C., and then thawed, the spermatozoa are non-motile; but when it is first diluted with glycerin (10%) and a buffer, many spermatozoa are motile after thawing. With this method no loss of fertility occurred in bull semen stored up to 32 weeks at -79 C., and subsequent work has shown the feasibility of storage for even longer periods. A number of artificial insemination centers are now using frozen semen to an increasingly greater extent.

Perhaps the most interesting application of glycerin in veterinary medicine in recent years has been its use in bovine ketosis. Johnson,[7,8] who has done much fine work in this field, found glycerin to be of great promise in the treatment of ketosis in cattle. He found it to be non-toxic orally in any but enormous doses. Diarrhea or other digestive disturbances were not produced, and it was palatable when added to grain. His case reports indicated good response to glycerin therapy in advanced ketosis when other treatments failed. Its use has made it possible to administer easily the large quantity of glucose precursor necessary to cause the blood glucose and ketones to return to normal levels, thus leading to a return of appetite. Cases of subclinical ketosis are quite prevalent, and while it does not endanger the life of the animal, it does cause a great depression in milk production. This method of treatment makes it practical to control subclinical cases and thus increase milk production as well as prevent these cases from becoming more serious. The recommended doses range from 1 to 4 lb., diluted in water and given by stomach tube or drench in advanced cases, or added to the grain in subclinical cases. Much work has been done during the past few years to determine the value of adrenocortical hormones in ketosis therapy. Undoubtedly, they are of great value. However, while the newer adrenocortical hormones stimulate glyconeogenesis and frequently reverse the symptoms of ketosis, they do so at considerable energy expense in an animal which is already under great stress.

The use of glycerin in pregnancy toxemia in ewes was reported by Griffiths[9] as being satisfactory. Glycerin was given in 4 oz. doses mixed with an equal quantity of water and a small amount of chlorodyne. In one flock, 11 of 12 recovered, and in the other, three of four recovered following the glycerin therapy.

In order to investigate the claim that glycerin is more effective than glucose as a cure for pregnancy toxemia in ewes, Johns[10] compared the products of fermentation of these two materials in the rumen of sheep. It appears that glycerin is likely to be superior therapeutically to glucose as the former is converted to propionic acid, antiketogenic substance, while the latter gives rise to a mixture of acetic, propionic, and butyric acids, the last of which is ketogenic.

Glycerin, when given by mouth, is demulcent and laxative. It is used as a sweetening agent in mixtures and as an ingredient of electuaries. It serves thus as a ready source of calories and may be employed as a vehicle in place of syrups. The writer has made good use of these properties in cough preparations for use in small animals. For example, in one preparation, each 10 ml. dose contained 15 mg. of codeine phosphate and 10 mg. of papaverine hydrochloride in a vehicle composed of syrup of tolu balsam and glycerin. A mixture which has been of considerable value in cases of bronchial asthma in dogs is as follows:

Rx

Potassium Iodide	4.0
Belladonna Tincture	4.0
Glycyrrhiza Fluidextract	15.0
Glycerin	20.0
Water, to make	90.0

Label: One teaspoonful every four hours.

Among the many treatments utilized in pharyngitis in small animals is the painting of the walls of the pharynx with a solution of iodine in glycerin. When fibrinous membranes are present they should be cautiously removed and the inflamed surface beneath painted with tannic acid glycerite, 1 or 2% silver nitrate solution, or a mixture of alum in glycerin.

It has been reported that alevaire®, a preparation that has been widely used as an aerosol in the treatment of respiratory ailments, functions as a true topically active expectorant which lowers the surface tension of practically homogenized sputum.[11] It also serves as a deeply penetrating surface-active vehicle for many drugs, including bronchodilators and antibiotics. Active ingredients are 0.125% superinone, a nonionic surfactant, 2% sodium bicarbonate, and 5% glycerin. The function

®Winthrop Laboratories, Inc., New York, N. Y.

of glycerin is to prevent evaporation of droplets, to stabilize droplet size and to assure the carrying of actual liquid droplets into the bronchial passages.

When administered rectally, glycerin promotes peristalsis, local irritation being caused by the absorption of moisture from the mucous surfaces. It is warmed and administered undiluted, or with the addition of one-third of its volume of water, in the treatment of constipation and rectal impaction. In smaller animals, glycerin suppositories may be used. Quite frequently in dystocia in small animals, a lubricant appears desirable, and warm glycerin instilled well into the uterus usually proves satisfactory.

Diluted with one or two volumes of water, glycerin is demulcent and emollient. It has been used to paint the lesions in fowl pox and to soften the crusts in scaly-leg in poultry.

Glycerin is also used as a preservative, especially in solutions of digestive enzymes, in certain vaccines, and in some tinctures to prevent precipitation of principles which would otherwise in time be deposited. Glycerin absorbs moisture and is often included in non-oily pastes and creams to prevent these from drying-out.

The dermatological applications of glycerin are as numerous as the preparations containing it. It is of importance not only therapeutically but pharmaceutically as well. For example, in preparing lotions containing sulfur the writer has made it a practice to triturate the sulfur powder with glycerin before mixing in the remainder of an aqueous preparation. Sulfur is, for classification purposes, a hydrophobic powder, and therefore is difficult to incorporate into lotions. Agglomerated particles of it entrap air, which causes the sulfur to float to the surface of the lotion. Trituration with glycerin serves to remove the air.

Hydrogen peroxide glycerite is of considerable value as a cleansing agent in cases of otitis externa in dogs, according to Kral,[13] who also makes use of a mixture of 10% glycerin in mineral oil as an emollient for crusted squamous conditions, especially of the extremities.

Microscopic tests of scrapings taken from suspected skin lesions or of hair showing fluorescence are, as a rule, reliable yet a relatively simple method of determining the presence of a fungus. For staining of the hair or skin scrapings, the lactophenol cotton blue stain has been suitable. It consists of:

Phenol crystals	20 gm.
Lactic acid	20 ml.
Glycerin	40 ml.
Distilled water	20 ml.

Dissolve by heating gently under a hot water tap. Add 0.05 gm. cotton blue.[13]

In chronic dermatitis, the basic principle of therapy is to attempt to direct it, as rapidly as possible, into an acute condition, because an acute dermatitis is more responsive to treatment. Medication is chosen, therefore, which is able to dilate the blood vessels, stimulating hyperemia and increased serous and leukocytic exudation. Among the therapeutic agents used is the following:

Rx

Strong Iodine Tincture	15.0
Glycerin	45.0

With excessively moist lesions in acute eczemas, drying may be facilitated by the use of from 3 to 5% alcoholic solutions of methylene blue or gentian violet or by use of the following preparation:

Rx

Zinc Oxide	3.0
Bismuth Subnitrate	3.0
Glycerin	1.0
Starch	1.0
Water	20.0

In moist dermatitis lesions associated with pruritus, the author has had excellent results with the following lotion:

Rx

Zinc Oxide	18.0
Talc	18.0
Glycerin	12.0
Diluted alcohol, to make	120.0

For treating interdigital moist eczema in dogs and cattle, ointments are not recommended. Of course, the affected parts must be kept clean. Packs of Jarisch's solution constitute an effective treatment.

Rx

Boric Acid	10.0
Glycerin	15.0
Distilled water	300.0

The warm packs are changed every five minutes for about half an hour, and then a powder containing coal tar, salicylic acid, ichthyol, and kaolin is applied.

When the skin of the interdigital spaces is affected with a microgenic inflammation, Rainey[14] applies a cold cataplasm in a thick layer two to three times daily. The cataplasm

consists of a kaolin-glycerin mixture. No bandage is used.

Kral[15] recommends the following preparation for topical application in the treatment of seborrhea:

Rx

Salicylic Acid	1.0
Glycerin	3.0
Alcohol, to make	60.0

Many preparations are utilized in cases of alopecia, one excellent lotion being:

Rx

Mercury Bichloride	2.0
Glycerin	20.0
Diluted Alcohol	100.0

The treatment of fowl pox is largely local in character. The cutaneous form is treated by surgical removal of the wart like epithelioma. Also, glycerin-salicylic acid-collodion or a solution of silver nitrate may be applied. In diphtheric changes of the mucous membranes, the pseudomembrane is removed and the lesions are then treated with solutions of iodine and glycerin, salicylic acid, or silver nitrate.

In contagious ecthyma of sheep and goats, a 3% iodine solution in glycerin is used frequently in the treatment of skin and mucous membrane lesions with rather good results.

In treating canine ear mange, Kral[12] recommends first cleansing the ear by swabbing with dilute alcohol. When the canal has dried, the following preparations may be used:

Rx

Peruvian Balsam	
Glycerin	aa

Rx

Iodine Tincture	10.0
Glycerin to make	100.0

Rx

Carbolic acid	2.0
Glycerin	10.0
Alcohol	50.0

Glycerin finds frequent use in the formulation of dog shampoos. One such formula is as follows:[16]

Rx

Soft Soap	240 gm.
Glycerin	75 gm.
Alcohol	60 gm.
Phenol	12 gm.
Eucalyptus Oil	8 gm.
Water, to make	1050 gm.

A surgeons lubricating jelly, used frequently in veterinary practice, consists of:

Rx

Tragacanth	84 gm.
Chondrus	42 gm.
Glycerin	2270 gm.
Boric Acid	280 gm.
Methyl Paraben	2.8 gm.
Purified Water	5600 gm.

Kaolin cataplasm has been used much and is a paste made up of kaolin, boric acid, thymol, methyl salicylate, peppermint oil, and glycerin. It is applied hot on cloth as a counter-irritant and keeps its heat for a long time.

Formulae of somewhat stronger counter-irritants are as follows:

Rx

Iodine Tincture 7%	120.0
Turpentine	30.0
Glycerin	30.0
Croton Oil	0.5

Label: Apply daily without covering.

Rx

Iodine Tincture 7%	180.0
Glycerin	180.0
Camphor Spirit	180.0
Isopropyl Alcohol, to make	1000.0

Label: Apply to affected area, rub well, and cover with sheet cotton and bandage.

Many compounds, preparations and derivatives of glycerin are in frequent use. Glycerinated gelatin, various glycerophosphates, glycerinated gentian elixir, and several glycerites are a few among the many in this category. Glyceryl trinitrate, or nitroglycerin, has been used in pulmonary edema and pulmonary congestion. However, its use in the presence of cardiac failure is dangerous and is not recommended.[17] Nitroglycerin has also been used in spasmodic bronchial asthma in dogs in doses of 0.4 to 0.6 mg. Recently, a derivative of glycerin, monothioglycerin, has been used to prevent discoloration, precipitation and deterioration of aqueous streptomycin solutions over extended periods.

Glycerin is made use of in many commercial pharmaceutical preparations, and the following list is but a smattering of the many products that are available.

Amerotol (Arnar-Stone)$_1$*
Benzocaine, oxyquinoline benzoate, and glycerin, in water-soluble base.
Use — Analgesic ear drops.

Anthrax Spore Vaccine Intradermal (Jen-Sal)$_2$
Suspension of attenuated anthrax spores in a glycerin base. The glycerin promotes

*Inferior numbers refer to addendum.

viability of the spores and stimulates immune response.
Use: — Anthrax immunization.

Anti-Ferm (Carter-Luff)[3]
Aloin, salicylic acid, glycerin and water.
Use — Laxative; antiferment.

Calomox (Haver-Lockhart)[4]
Mercaptobenzothiazole, sulfathiazole, sulfur, in a phenolated calamine lotion with glycerin.
Use — Protective, antipruritic, astringent, bacteriostatic fungicidal skin lotion.

Caripeptic Liquid (Upjohn)[5]
Enzyme mixture (carica papaya, malt diastase), aromatic oils, alcohol, glycerin, and elixir base.
Use — Digestant.

Cremacal (Hobart)[6]
Calamine, benzocaine, phenol, and glycerin in water-miscible ointment base.
Use — Antipruritic.

Dihydrostreptomycin Otic with Bristamin (Bristol)[7]
Dihydrostreptomycin base, bristamin dihydrogen citrate, sodium citrate anhydrous, phenol, and glycerin.
Use — Antibiotic, fungicidal ear drops.

Earol (Haver-Lockhart)[4]
Antipyrine, benzoic acid in an anhydrous glycerin base.
Use — Otitis therapy.

Glycerite of Hydrogen Peroxide with Carbamide (International Pharmaceutical Corp.)[8]
Urea peroxide in anhydrous glycerin.
Use — Topical antiseptic and peptizing agent.

Guaia Potonate (Sutliff)[9]
Potassium guaiacol sulfonate, ammonium chloride, phenol in glyceroaqueous base.
Use — Expectorant.

Irodex (Haver-Lockhart)[4]
Iron sulfate, copper and cobalt sulfates in glycerinated dextrose base.
Use — Hematinic.

Lubricating Jelly (Jen-Sal)[2]
A glycerinated, tragacanth jelly with boric acid, and thymol.
Use — Lubricant.

Myringacaine (Upjohn)[5]
Benzocaine and ephedrine hydrochloride in a glycerin-propylene glycol base.
Use — Analgesic and decongestant ear drops.

Ophthaine Solution (Squibb)[12]
Local anesthetic agent with 2.45% glycerin as a stabilizer.
Use — Ophthalmic anesthetic solution.

Otobiotic (White)[10]
Neomycin sulfate, sodium propionate in hydro-alcoholic-glycerin vehicle.
Use — Ear drops (antibacterial and antifungal).

Otomide (White)[10]
Sulfanilamide, urea, chlorobutanol in glycerin.
Use — Anesthetic, antibacterial ear drops.

Purina Cre-So-Fec (Ralston-Purina)[11]
Cresylic acid, vegetable oil soap, water and glycerin.
Use — General disinfectant.

Senodin (Squibb)[12]
Codeine sulfate, fluid extracts of ipecac, sanquinaria, senega, and squill, menthol, in glycerin and alcohol.
Use — Sedative expectorant.

Skin Ease (Goshen)[13]
Alcohol, menthol, salicylic acid, resorcinol, methyl paraben in glycerin.
Use — Local anodyne.

Tyotocin Ear Drops (Merck Sharp & Dohme)[14]
Tyrothricin, benzocaine, antipyrine, hexylresorcinol, propylene glycol, and glycerin.
Use — Antibacterial, antifungal, analgesic ear drops.

Ureka-Sulmide (Jen-Sal)[2]
(Solution)
Sulfanilamide, sulfathiazole, urea, benzyl alcohol in propylene glycol and glycerin.
Use — In treatment of mastitis, wounds, and metritis.

ADDENDUM

1. Arnar-Stone Laboratories, Inc., 225 E. Prospect Ave., Mt. Prospect, Ill.
2. Jensen-Salsbery Laboratories, Inc., 21st and Penn St., Kansas City 41, Mo.
3. Carter-Luff Chemical Company, 738 Warren Street, Hudson, N. Y.
4. Haver-Lockhart Laboratories, Box 676, Kansas City 41, Mo.
5. The Upjohn Company, 223 E. Lovell St., Kalamazoo 99, Mich.
6. Hobart Laboratories, Inc., 900 N. Franklin St., Chicago 10, Ill.
7. Bristol Laboratories, Inc., 630 Fifth Ave., New York, N. Y.
8. International Pharmaceutical Corp., 1700 Walnut Street, Philadelphia 3, Pa.
9. Sutliff and Case, Inc., 201 Spring St., Peoria, Illinois.
10. White Laboratories, Inc., Kenilworth, N. J.
11. Ralston-Purina Company, 835 S. 8th St., St. Louis 2, Mo.

12. E. R. Squibb & Sons, Div. Mathieson Chemical Corp., 745 Fifth Ave., New York 22, N. Y.
13. Goshen Laboratories, Inc., Goshen, New York.
14. Merck Sharp & Dohme, West Point, Pa.

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Insect Control of a Poisonous Plant

Biological control for a poisonous plant, halogeton, may result from findings of a group of traveling entomologists of the USDA.

Working in the Middle East, scientists have discovered 80 to 120 different types of insects that feed on halogeton, a plant native to Russia which has become established over some 9,000,000 acres of western rangeland. First identified in Nevada in 1934, research has since established the poisonous properties of the plant. Halogeton causes death to both sheep and cattle, when grazed along trails, by rapidly lowering blood calcium concentration.

Much screening of insects must be done to test susceptibility of the plant to insect feeding and the potential damage to useful related plants.

Disease Resistance in Garbage Fed Swine

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The control of cholera in swine fed raw garbage has posed a difficult problem. This report recounts satisfactory results in stimulating immunity under unfavorable conditions with the use of modified live virus, rabbit origin, vacuum dried vaccine,* in a garbage fed herd.

Raw garbage has been considered to be a prime source of hog cholera and other acute infections.[1,2,3] In the herd reported here, there are additional disease hazards through heavy concentration of animals in restricted areas, poor ventilation, dampness, and lack of sunshine. This situation provides a severe test for any vaccine.[4]

Virulent virus and antiserum have been used in this herd of about 350 pigs for many years. Postvaccinal reactions were common and usually severe, with death losses near 20%. At one time the owner considered elimination of vaccinations since apparently hazards of infection were less than losses following immunization procedure. Three years ago, an effort was made to determine whether these problems could be avoided by selecting modified live virus vaccine (swivax) for immunization. Dosage of 2 cc. swivax and 15 cc. hog cholera antiserum was chosen as basic for 30 lb. pigs. To date approximately 4,000 pigs have been vaccinated by this method.

Approximately 35 sows constitute the breeding females farrowing approximately 300 pigs annually. These are the only replacements to the herd. They are vaccinated at six weeks of age, at which time they are receiving about one-half raw garbage and are nursing. They are on full raw garbage at about eight weeks of age and are maintained on this ration alone until marketing time (eight to nine months of age.)

It has been observed that since the use of swivax and serum was initiated, more uniform litters are farrowed, pigs are more rugged, and develop more uniformly. While virulent virus and serum was used, pigs farrowed were weak frequently and litters often contained many runts. It was noticed also that when live virus and serum were used, there developed a postvaccinal "lag" period of five to seven days when pigs ate sparingly, were inactive, and

*Swivax—Pitman-Moore Co., Indianapolis, Ind.

lost weight. Since a change was being made from nursing to raw garbage at that time, this slow-down in progress was of economic importance.

The sows in this herd are vaccinated with swivax and serum as baby pigs, and not revaccinated. They remain in the herd as long as they produce profitable litters, usually until four years of age. Boars are purchased from nearby farms as young adults and vaccinated, as mentioned above, upon arrival on the farm. They are not revaccinated and are kept for three to four years.

Observations

Farrowing goes on constantly in this herd and pigs of various ages are mixed. Some are too young to be vaccinated and are nursing, others are in varying stages of nursing and feeding on raw garbage. There is a continuous possibility of exposure to cholera and other diseases, with animals in the herd having varying degrees of immunity. The disease hazard is high; all ages being exposed to these conditions as a single mixed lot. Even though litters are kept in separate pens, the management practices are such that infection can be transmitted easily, and susceptibles thus exposed to disease.

There is no evidence that swivax spreads disease in this herd. This is similar to experiences reported by Johnston.[5] When virulent virus and serum was used it was almost impossible, even with diligent efforts, to prevent susceptible pigs from becoming infected.

After the change to swivax and serum, death losses have practically disappeared. This parallels experiences of others.[6] Previous to this change, an average of six of ten pigs farrowed reached market. Since, an average of nine of ten born are marketed. The losses at present are principally during the first weeks of life from injuries, overcrowding, et cetera. The pigs farrowed now are uniform in size, active and rugged, as contrasted to many runts, and others unprofitable, under the old vaccination procedure. Since herd conditions were the same under both immunization programs, sows appear in better general health adding value to the immunization procedure over that of reduction of death losses. This is shown also by the lower incidence of all acute infectious diseases, better weight gains and overall more profitable returns. The owner recognizes and remarks about these improvements.

Since the cows are not revaccinated, they apparently continue to pass antibodies to the litters, which have no other protection until about six weeks of age. From about four to six weeks, they are adjusting from part nursing to raw garbage and undergoing other conditions which can lower disease resistance. Low incidence of acute disease during this period must be attributed in large part to parenteral protection.

Conclusions

1. In the drove of raw garbage fed swine reported, experience with virulent cholera virus and antiserum over the years has resulted in losses up to 20% of the annual pig crop.

2. Modified live virus vaccine (swivax) with antiserum produced effective protection to cholera in this drove under the management conditions as practiced for years, with other disease problems being greatly reduced.

3. The new procedure does not spread disease in this herd although susceptible pigs are always present.

4. Immunity induced evidently remains at a high level in sows vaccinated only once, since litters remain healthy while nursing under conditions of exposure.

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Discolored Chicken Bones

The darker meat and bones noted in chicken legs and wings aren't anything to worry about, according to *Broiler Growing* (Dec. 1956). University of Wisconsin scientists are cited as stating that bone discoloration observed in the chicken you eat is simply a result of marketing birds at an earlier age than has ever been done before. It is no sign of an inferior chicken.

Effects Of Various Surface Active Agents On The Surface Tension And Other Properties Of Paunch Fluid†

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THE possibility that some of the surface active agents may play a role in helping to control bloating in cattle and sheep on legume pastures or in feedlots has resulted in an increased interest in compounds of this category. There are many hundreds of these and their individual properties vary considerably. Their commercial uses vary also and are always changing as new compounds and applications are discovered. A comprehensive review of this field would be too extensive for a paper of this kind. Most technical libraries contain books, articles, and reviews on the nature of these substances but even these are not abreast with the rapid strides of their commercial development.

Particularly active is the field of application of combinations of compounds to allow greater selection of the desirable and greater control of less desirable properties. Most noticeably advanced is the field of synthetic household detergents. These materials have replaced a large quantity of soap for general washing purposes. The active agents in some of these detergents seem to shift with commercial availability. Properties other than "detergency" have been useful in many specialized applications. Such properties are surface tension reduction, emulsification, wetting ability, foaming ability, foaming control, bactericidal activity, resistance to acid or alkali, dispersibility, penetrability, etc.

These agents are classed as anionic, cationic or nonionic depending upon which fraction of the compound is active. There are hundreds of examples of each group. Biological data are generally quite deficient, but will increase as the use of these agents become more diversified.

It has been reported that excessive frothing may be an important factor etiologically in both legume and grain bloats.[1-5]

It has also been demonstrated that an increase in the physical "consistency" of paunch contents is a contributory factor to frothiness and bloat,[1] although the physical properties determining "consistency" were not specifically defined. A probable reason for foam formation, its position in the paunch, and its possible role in preventing eructation have been discussed.[5]

Methods

As the first step in attempting to determine whether these agents can control excessive paunch frothing, several surface active agents were examined *in vitro* for their effects upon apparent surface tension (ST), relative viscosity (V), gas production (GP), mechanical foaming (MF), sediment reaction (SR), and cellulose digestion (CD) of ventral paunch fluid.

Apparent surface tension was determined in dynes with a DuNuoy tensiometer and relative viscosity (relative to distilled water) with a Stormer viscosimeter. Gas production was recorded as the amount of gas removed in two hours from a 155 ml. sample of paunch fluid incubated at body temperature in a closed system with 22 inches of negative pressure. Mechanical foaming was an estimate of the amount of foam produced by mechanically shaking at 230 strokes per minute, over a ¾-in. horizontal distance, a 155 ml. sample of fluid in a 500 ml. Erlenmeyer flask in a water bath at body temperature. Sediment reaction was the time in minutes necessary for the majority of food particles in a 20 ml. sample of fluid strained through one layer of gauze and

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TABLE 1. Means and Standard Deviations of Immediately Measured Untreated Control Samples of Ventral Paunch Fluid (Initial) and Untreated Controls of the Same Sample After *in vitro* Gas Production (2-Hour)

	Surface Tension (dynes)		Viscosity (Relative)		Gas Production (ml) 2-hour Control	Sediment Reaction (Minutes) Control
	Initial Control	2 hour Control	Initial Control	2 hour Control		
Means	53.3	51.7	1.109	1.085	65	4.5
Standard Deviations	2.3	2.8	0.049	0.043	11	1.8
No. of Samples	193	192	193	192	171	193

contained in a 25 ml. graduated test tube to separate and rise to the surface. Cellulose digestion was adjudged by determining whether the time required for the breaking of a cotton thread weighted by a small piece of glass tubing and suspended in paunch fluid, maintained at body temperature was greater or less than the controls.

All samples were removed from the ventral sacs of the paunch of two fistulated cows within two hours after the animals were fed alfalfa hay. Each sample was strained through one layer of gauze to remove coarse food particles. All determinations were made as near body temperature as practically possible.

One hundred twenty-five ml. of each paunch sample were used for immediate measurements of ST and V (initial control). A 155 ml. portion of the same paunch sample was used for determining GP and for measurements of ST, V, MF, SR and CD at the end of the gas measuring period (two hour control). Known quantities of surface active agents were added to initial 155 ml. quantities of the same paunch sample and the same measurements were made at the end of the gas measuring period. It was not possible to ascertain the exact chemical content of each agent employed. Some were undoubtedly "built" detergents containing different classes of surface active agents and in differing percentages. Each agent was assigned a code number.

Results

Data of at least six different paunch samples for each of 98 added agents were collected. Differences between samples to which the various agents were added and their respective initial and two-hour controls were calculated. Means and standard deviations of measurements of ST, V, GP, and SR of initial (I) and two hour (2H) control samples were determined (table 1).

Twenty of the agents in the lowest concentration used (10 mg. per 155 ml. fluid) consistently produced ST reductions greater than two standard deviations from their controls. Five of the 20 were eliminated because of consistent evidence of lowered GP, delays in SR or CD, or increased MF. None produced any appreciable change in V. Of the 15 remaining (table 2), four were products containing alkyl aryl sulphonate (agent no. 6, 36, 73, 74), two lecithin (no. 87, 91), two methyl silicone (no. 9, 54), and the remaining seven were of composition unknown to the authors.

TABLE 2. Effects of Various Surfactants upon Surface Tension and Other Properties of Paunch Fluid

Agent No.	Initial Surface Tension Reduction (dynes)	Initial Viscosity Differences	Gas Production Differences (ml.)	Sediment Reaction Differences (min.)	Mechanical Foaming Differences	Cellulose Digestion Differences
5	—5.3	—0.012	+2	+0.5	0	0
6	—8.3	—0.036	+2	0	0	0
9	—6.7	+0.025	+1	+0.5	0	0
25	—6.8	—0.029	+7	+1.5	0	0
26	—6.1	—0.031	—5	+0.5	0	0
36	—5.1	—0.018	—2	+1.0	0	0
46	—10.6	—0.023	—3	+1.5	0	0
49	—6.1	—0.021	+3	0	0	0
50	—9.0	—0.029	—4	+1.5	—	0
54	—5.1	—0.044	—6	+1.5	—	0
55	—5.8	—0.037	+4	+1.0	0	0
73	—5.8	+0.001	+1	+2.0	0	0
74	—6.1	—0.014	+5	+2.0	0	0
87	—6.8	—0.021	—11	+0.5	—	0
91	—5.8	—0.016	+1	+0.5	0	0

TABLE 3. Effects of the Administration of Various Surfactants upon Surface Tension and Other Properties of the Paunch Fluid

Agent No.	Dose gm.	Initial Surface Tension Reduction (dynes)	Initial Viscosity Differences	Gas Production Differences (ml.)	Sediment Reaction Differences (min.)	Mechanical Foaming Differences	Cellulose Digestion Differences
9	5	—15.5	—0.042	0	+2.0	0	0
28	5	—9.2	—0.013	—1	—1.0	0	0
74	5	—9.5	+0.020	+2.6	+1.0	—	0
9	10	—14.3	+0.033	0	—1.0	0	0
63	10	—7.6	+0.040	+4	0	0	0
88	10	—17.5	0	....	....	—	0
23	20	—5.9	+0.041	0	0	—	0
76	30	—6.8	—0.014	0	+1.0	—	0

In concentrations higher than 10 mg. per 155 ml. fluid, silicone was less reliable in ST reduction, yielded some evidence of lower GP, a slight delay in SR, but good control of MF; sulphonate was more reliable in ST reduction but yielded more evidence of delayed SR and CD; lecithin was more reliable in ST reduction, yielded better control of MF but there was some evidence of delay in SR in one form of the product.

A granular plant lecithin, 92% active, in a concentration greater than 20 mg. per 155 ml. fluid has consistently given the greatest reduction in ST of paunch fluid, good control of MF, and little evidence of any consistent alterations in GP, SR, or CD.

Methods

Seven of the agents were chosen for administration into the rumen of the fistulated cows for measurements of their effects upon paunch fluid. Ten mg. in 155 ml. of fluid represents an approximate concentration of 65 p.p.m. if equally dispersed in a 25 gal. paunch or a dose of approximately 6.5 gm. to a cow of this capacity. The differences in measurements of the same properties of samples of paunch fluid were calculated.

Results

In 5 gm. doses three agents reduced ST to more than two standard deviations from predose controls and caused little alteration in other properties (table 3). One product was a silicone preparation, one an alkyl aryl sulphonate, and one of composition unknown to the authors.

In 10 gm. doses two additional agents also effectively reduced ST. One was a lecithin product and the other of unknown composition. In 20 and 30 gm. doses two common household detergents containing about 30% alkyl aryl sulphonate effectively reduced ST and MF.

Methods

Since silicone products are already being evaluated, it was decided to ascertain whether some forms of the sulphonates and lecithins would fit accepted husbandry practices. One agent in powder form, an 82% active alkyl aryl sulfonate (rat LD_{50} = 1.5 gm./kg.), was chosen to determine the feasibility of feeding in grain and in block salt. It was fed to approximately 1,400 cattle either in 5 gm. and 10 gm. quantities in grain or in salt blocks containing 10% of the agent or both.

Results

Despite the bitter taste, feeding in grain appeared to be feasible when several pounds of grain were fed. There was evidence, however, that intake of salt from blocks containing the agent was restricted, apparently because of the bitter taste. Several masking procedures and substances were tried with no practical success except in mixes where dilution alone rendered the mix acceptable. Feeding trials with mixes and other more palatable substances are still in progress.

The lecithin products in some forms bring about good foam control both *in vitro* and *in vivo*. Their feasibility in husbandry practices is superior to the sulphonates because they are more acceptable to cattle in grain mixes even though blocking in salt has not been successful. One such mix containing lecithin and alkyl aryl sulfonate in an especially prepared corn meal has been fed at 1 lb. per four cows and resulted in good ST reduction and good foam control for a few hours.

Discussion

Many livestock owners and practicing veterinarians have reported effective reduction of legume bloating by administration of alkyl aryl sulphonate based detergents.

TABLE 4. The Effects of Some of the Common Household Detergents Upon the Reduction in Specific Gravity of Ventral Paunch Fluid Produced by Feeding Fresh Red Clover

Feed	Hay	Grass	Clover	Clover	Clover	Clover	Clover	Clover	Clover	Clover
Agent No.	None	None	None	23	86	76	85	36	36 Next Day	36 4 Days Later
Dose	None	None	None	30 gms.	30 gms.	30 gms.	30 gms.	15 ml.	None	None
Before Feeding and Dosing	1.0110	1.0108	1.0094	1.0112	1.0130	1.0117	1.0116	1.0103	1.0072	1.0102
½ Hour After Feeding	1.0065	1.0042	0.9815	1.0045	1.0058	1.0082	0.9954	1.0042	1.0017	0.9715

The manner in which certain surface active agents reduce frothing is still not adequately explained. In addition to physical changes of paunch fluid there is always the possibility that they also may produce metabolic alterations in paunch organisms.

Although the exact reason has not been ascertained, some of these agents temporarily control the greater reduction in paunch fluid buoyancy which is associated with fresh legume feeding as compared with hay or grass feeding.[6] Agents 23, 86, 76, and 36 placed in the paunch after taking the pre-feeding sample controlled the post-feeding reduction in specific gravity to more nearly the reductions observed with hay or grass (table 4). Agent 85 did not. This effect appears to persist only a day or so which would suggest the necessity of frequent consumption of the agent.

Exact doses and critical safety data generally are unavailable, although repeated 1 oz. doses of sulfonate-based detergents and continued feeding of lecithin have not resulted in any obvious difficulties. Considering the multitude of agents and combinations available and their various peculiarities, it is encouraging that useful substances may appear in the offing which will allow safer and more extensive use of high yielding legumes until such time as non-bloat producing legumes can be found or bred.

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Phenothiazine: Efficacious and Safe Anthelmintic

Phenothiazine is a synthetic organic compound prepared by the union of diphenylamine and sulfur in the presence of iodine as a catalyst. It has well established application in horses, cattle, sheep, goats, swine, and poultry. Against many of the damaging gastrointestinal roundworms, it is the most effective treatment — and for some species the only known treatment.

Phenothiazine evolved in three periods: The discovery of its application as a standard anthelmintic (1938-1940); standardization and development of methods of using the drug to achieve effective control of parasites (1941-1948); and its greatly increased use (from 1948) in cattle, particularly free-choice and low-level systems of preventive medication of beef cattle and dairy calves. The third stage marks an awakening to the importance of parasitism in cattle and a recognition of the benefit that may be derived from controlling subclinical parasitism in cattle and other livestock. —*from Yearbook of Agriculture, 1956, by A. O. Foster, Sc.D.*

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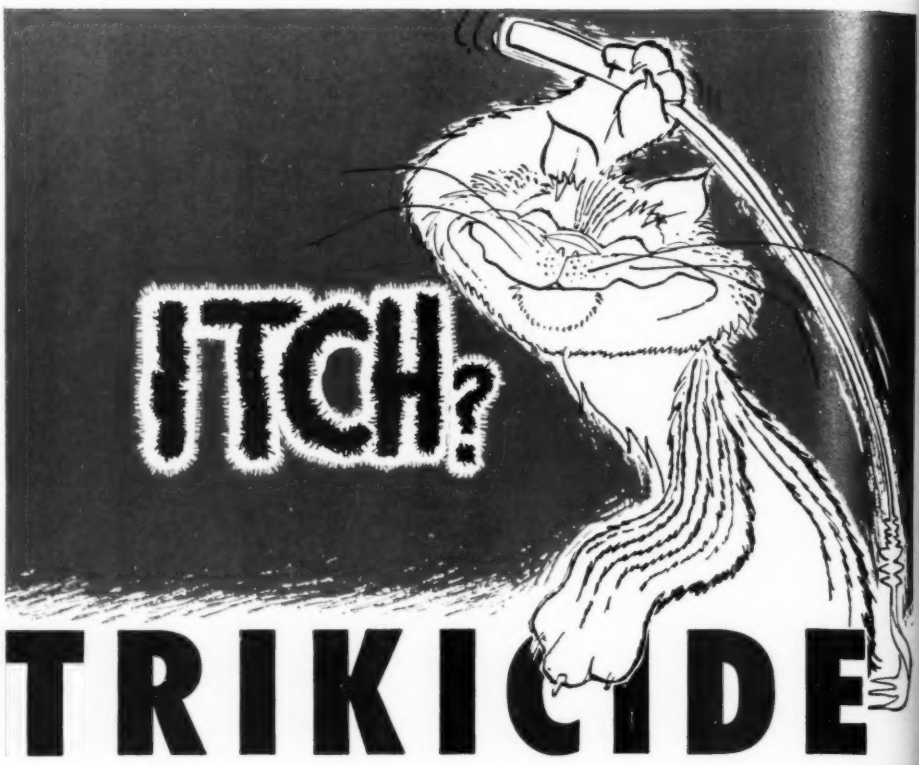
Boar Semen Storage Limited

Most boar semen must be used the day it is drawn, and where artificial insemination of sows and gilts is practiced undiluted semen is used. Dilutor for that portion of the ejacula having the highest concentration of sperm have been developed but none are of a quality comparable to that employed for bull semen. Storage under any condition is limited to 12 to 24 hours.

Small Animal

SECTION

THERAPEUTICS • MEDICINE • SURGERY



TRIKICIDE

Trikicide Powder is a highly effective bactericide and fungicide for the treatment of dermatoses in both cats and dogs. A "dry" medication, it is recommended for preventing and treating ringworm, moist eczema and other weeping skin lesions, and ear canker.

The primary ingredients of Trikicide powder are 2, 2'-methylene-bis (4 chlorophenol) and oxyquinoline benzoate. Nontoxic to the host, this specially processed powder clings to the skin, promoting contact of the active ingredients with the causative agents.

Supplied: **Trikicide Powder**—Pkg. 12 x 1¼ oz. plastic spray bottles; 1 lb. hospital size.
Trikicide Solution—12 x 4 oz. plastic squeeze bottles; gallon bottles.

Other Haver-Lockhart products for the treatment of dermatoses in other animals:

PYLOSE POWDER AND CAPSULES
for the treatment of skin diseases due to fatty acid deficiency.

BLUSOL
parenteral for systemic treatment of protozoan infections and selected skin conditions.

Division of
HAVER-LOCKHART LABORATORIES
Kansas City, Missouri

SMALL ANIMAL PRACTICE

V
M

Multiplication Of Attenuated Egg-Adapted Distemper Virus In The Vaccinated Host

JOHN R. GORHAM, D.V.M., Ph.D., R. KEITH FARRELL, D.V.M., RICHARD L. OTT, D.V.M., and THOMAS PARISOT, B.S., Pullman, Washington

TO be effective as a vaccine, attenuated live virus must provoke an infection in the host. This report is concerned with *in vivo* multiplication of egg-adapted distemper virus (DV).

Materials and Methods

Virus. The Onderstepoort variant of egg-adapted DV was used throughout the experiment. It was obtained in 1950 at the 79th passage level from Dr. David Haig. To maintain viability, it has been passed at regular intervals. Repeated titrations in fertile hens' eggs were made over a seven year period to determine the 50% infectivity end points. The arithmetic mean for 175 titrations was $10^{-4.05}$. Occasional inoculation of chorioallantoic membrane (CAM) suspension into susceptible ferrets has revealed no observable signs of illness. In the present study, virus from the 88th-90th passages was inoculated onto the CAM's of eight-day embryos. After seven days further incubation, the CAM's were harvested and ground with a diluent (Difco nutrient broth containing 100 units of penicillin and 100 micrograms of streptomycin per milliliter). The inoculum was standardized by a titration consisting of serial fivefold dilutions of virus. In the following trials the 50% infective dose per 0.1 ml. of inoculum in chick embryos was approximately $10^{-3.8}$.

The challenge virus for the ferret trials was a ferret-passaged agent (Green's distemperoid). Each ferret received subcutanously 1 ml. of 10^{-1} spleen-lung suspension in broth containing antibiotics.

Antiserum. Canine distemper antiserum from several commercial sources was pooled and stored at 5 C. This antiserum had a 50% neutralizing dose titer of 1:300 on the chorioallantois, using 500 id_{50} (units) of Onderstepoort virus. Specific DV antibody prepared by bleeding surviving ferrets in vaccine trials was used in experiment 5.

CAM Inoculation. The manner of inoculation differs from the usual dropped chorioallantois technic and will be presented in a separate report. Briefly, the inoculating needle is introduced through the shell over the blunt end of the egg. The inoculum is released in the air sac above the inner shell membrane, and the inner shell membrane and CAM are pierced with a needle. After withdrawal of the needle, the inoculum passes rapidly onto the chorioallantois.

Animals. Ferrets, foxes, and mink were reared at the experimental farm of the Pullman

From the Animal Disease and Parasite Research Division, Agricultural Research Service, U. S. Department of Agriculture, in cooperation with the Washington Agricultural Experiment Stations (Gorham, Farrell, and Parisot) and the Department of Clinical Medicine and Surgery, College of Veterinary Medicine, State College of Washington (Ott), Pullman.

Scientific paper 1573, Washington Agricultural Experiment Stations.

This investigation was supported in part by Initative 171, Medical and Biological Research.

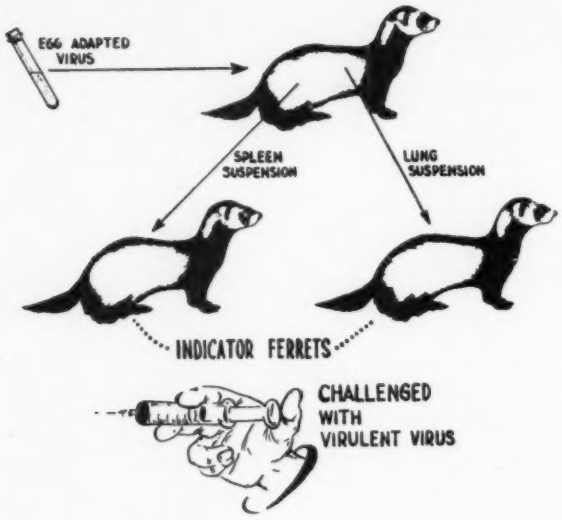


Fig. 1. Illustration showing the general plan of the experiment.

Fur Animal Disease Station. They were fed the regular ration, which consisted of fish, horsemeat, and cereals. Both sexes were represented in the trials. None of the animals had previous experience with DV. The dogs, of mixed Collie breeding, were obtained from an isolated farm when approximately ten weeks of age. Blood serum samples from the dogs, diluted 1:2, mixed with 100 units of virus and then titrated on the chorioallantois, did not reveal the presence of DV neutralizing antibody.

Experimental Work and Discussion

The general plan of the experiment is depicted in figure 1. Egg-adapted virus was inoculated into ferrets. These ferrets were sacrificed, tissues harvested, and suspensions made and inoculated into additional groups of ferrets. The ferrets receiving the tissue suspension were later challenged with virulent virus. These challenged ferrets were designated as indicator ferrets.

Thus, if *in vivo* multiplication of attenuated variant DV occurred in the ferrets inoculated with infected membrane suspension, it would be represented as immunity to challenge in the indicator ferrets. Conversely, if multiplication did not occur, the indicator ferrets would not be immunized and would be susceptible to virulent virus exposure.

Experiment 1. Sixteen ferrets were each inoculated with a 10^{-1} dilution of infected membranes. Of these, two were killed on the first day following inoculation and two every third day through the 21st day postinoculation (PI). For each of the eight designated days, the spleens were removed and combined, a 10^{-1} dilution was made in nutrient broth containing antibiotics, and a 1 ml. quantity of the dilution was inoculated into each of five indicator ferrets.

Thirty days following the last inoculation with ferret spleen material, all 40 indicator ferrets plus five susceptible and five immune control ferrets were challenged with virulent virus. The results of the test are given in table 1. On the 1st day PI, five of five indicator ferrets succumbed to challenge, which probably represented an eclipse phase preliminary to multiplication; on the third day PI, three of five indicator ferrets were immune,

TABLE 1. Results of Tests for the Presence of Variant Virus in the Spleen of Ferrets Receiving Egg-Adapted Virus

Days After Inoculation Spleen Collected	Results of Challenge*
1	5/5
3	2/5
6	0/5
9	0/5
12	3/5
15	4/5
18	5/5
21	5/5
Susceptible Controls	5/5
Immune Controls	0/5

*Numerator indicates the number of ferrets that died; denominator, the number inoculated.

giving evidence of early low-level multiplication of virus; and by the sixth and ninth days PI, all ten indicator ferrets had survived challenge, showing that multiplication was well advanced. Since three of five test ferrets succumbed to challenge on the 12th day PI and four of five on the 15th day, it was thought that the failure to immunize was due to *in vivo* neutralization by homotypic antibody. It appears, under the conditions of this test, that there was sufficient antibody to cause apparent destruction of attenuated virus from the 18th and the 21st day spleens. Neutralization tests using spleen material to detect antibody were not attempted; therefore, this interpretation of the fate of variant virus must be considered a speculation.

Urinary bladder sections, stained by the Pollack method, taken from ferrets which had received egg-adapted virus 15-21 days previously revealed occasional bodies in the cytoplasm and nucleus that resembled distemper inclusion bodies. More precise technics, such as Coon's histochemical demonstration of antigen with fluorescein-labeled immune serum, should be employed. Using Coon's method, Moulton and Brown[1] and Coffin[2,3] have recently demonstrated distemper viral antigen in inclusion bodies from dogs and ferrets infected with distemper.

Experiment 2. Inasmuch as variant virus was detected in the spleen, it was thought desirable to determine its titer in the spleen and lung as well. Two ferrets which had received egg-adapted virus eight days previously were sacrificed, and their spleens and lungs removed. Decimal dilutions were made from the spleen and lung pools and inoculated into indicator ferrets in 1 ml. quantities. The indicator ferrets were challenged 30 days later.

Under the conditions of the trial, the results recorded in table 2 indicate that the variant virus attained a higher titer in the lung tissue than in the spleen—about 100-fold difference. In previous work, Crook and Gorham[4] noted that virulent virus in ferrets had a titer of 10^{-5} in lung tissue on the seventh day and 10^{-6} on the ninth day following inoculation. Whether this higher level of replication with virulent virus means that more virus is produced per cell or more cells are involved is not apparent.

The appreciable titer of variant virus in lung tissue suggests that aerosol transmission of variant virus might occur under natural conditions. Reinhard and his coworkers,[5] in their description of a distemper outbreak in artic sled dogs, have postulated that egg-adapted vaccine was naturally transmitted from vaccinated dogs to placebo-injected team members soon after inoculation. That at least two egg-adapted strains of distemper virus are not transmitted by contact, under laboratory conditions, has been demonstrated by workers at this station[6] and by Cabasso,[7] who used the Onderstepoort and Lederle strains, respectively.

TABLE 2. Results of Tests for the Level of Variant Virus in Spleen- and Lung-Tissue Dilutions Eight Days Following Inoculation of Egg-Adapted Virus

Dilution of Lung Suspension	Results of Challenge*	Dilution of Spleen Suspension	Results of Challenge*
10^{-1}	0/2	10^{-1}	0/2
10^{-2}	0/2	10^{-2}	1/2
10^{-3}	0/2	10^{-3}	2/2
10^{-4}	1/2	10^{-4}	2/2
10^{-5}	2/2	10^{-5}	2/2
10^{-6}	2/2	10^{-6}	2/2
Susceptible Controls	5/5		
Immune Controls	0/5		

*Numerator indicates the number of ferrets that died; denominator, the number inoculated.

Experiment 3. Important evidence of multiplication of attenuated viruses is the demonstration that their immunizing capacity can be neutralized by the presence of specific antibody. Accordingly, 1 ml. of 10^{-1} dilution of egg-adapted virus was inoculated into each of two ferrets that had been immunized previously. After an interval of eight days, they were sacrificed and their spleens removed. Serial decimal dilutions (10^{-1} through 10^{-6}) were prepared, and a 1 ml. quantity was injected into each of two ferrets for each dilution. After 30 days, these ferrets were challenged with virulent virus. None of the ferrets survived challenge, thus indicating that the egg-adapted variant was not present in the dilutions tested of the spleens of immune ferrets. Five control ferrets also succumbed to challenge.

Five ml. of a commercial distemper antiserum was administered to each of six ferrets simultaneously at different sites 24 hours prior to the injection of 1 ml. of a 10^{-1} dilution of egg-adapted virus. In this trial, there was evidence of virus neutralization, since three of the six ferrets were susceptible to challenge with virulent virus 30 days later. Six other ferrets, each given 5 ml. of antiserum and 1 ml. of a 10^{-1} dilution of egg-shaped virus simultaneously, were immune to virulent virus 30 days later. These results suggest that, in some instances, circulating antibody, allowed time for distribution, may neutralize the virus

before multiplication can occur and thus may prevent antigenic stimulus.

Experiment 4. Egg-adapted virus was detected in the lungs of foxes and mink. Lung tissues from two foxes and two mink were collected eight days after inoculation of egg-adapted virus. The lung tissues from each type of animal were pooled, and a 10^{-1} dilution was prepared and inoculated in a 1 ml. quantity into each of three ferrets. Thirty days after inoculation the three ferrets in each group were challenged and were found to be immune. Two control ferrets succumbed to challenge.

Experiment 5. As a more direct approach for the demonstration of the variant virus in the vaccinated host, three dogs were each injected with 2 ml. of an infected membrane suspension. Two of the dogs were sacrificed on the seventh day, and the remaining dog was killed on the eighth day. Separate spleen and lung suspensions were prepared from the dogs sacrificed on the seventh day and from the dog killed on the eighth day. Decimal dilutions (10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}) of each of the suspensions were made and inoculated onto the CAM's of seven-day developing chicken embryos. When the chorioallantois was exposed, evidence of variant growth was observed at the 10^{-3} level from the lung and spleen suspensions, but not at the 10^{-4} level. This growth was not extensive, but it was represented by a few discrete pocks and edema at the inoculation site. Passage of pooled membranes into an additional generation of eggs revealed extensive growth of DV on the chorioallantois. After two passages in eggs, the virus had a titer of $10^{-3.8}$ per 0.1 ml. of inoculum in embryonated eggs. Specific DV antiserum prepared for reference purposes had an nd_{50} titer of 1:500, using 500 id_{50} of this egg-propagated virus.

Summary

In vivo multiplication of variant egg-adapted distemper virus was demonstrated in ferrets, mink, foxes, and dogs. The egg-propagated virus attained a higher titer (100-fold) in lung tissue than in spleen.

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Missouri Adopts Policy on Administration of Rabies Vaccine

Following requests for a policy statement, the following release to veterinarians was approved jointly by the Missouri Department of Agriculture (Dr. L. A. Rosner, State Veterinarian) and the Division of Health (Dr. E. R. Price, Public Health Veterinarian):

1. Dogs six months of age or older at time of vaccination with chick-embryo vaccine shall be revaccinated again at the end of three years. Dogs less than six months of age at time of vaccination shall be revaccinated within six months. Exceptions: Should a rabies epizootic occur in an area and a quarantine be declared, all dogs vaccinated more than nine months prior to quarantine shall be immediately revaccinated.

2. Dogs vaccinated with other than chick-embryo vaccine shall be revaccinated annually.

3. Owners of dogs shall be furnished a certificate giving the date, owner's name and address, breed, color, sex, weight and tag number, as well as the name of the pharmaceutical company producing the vaccine and the lot number of the vaccine used.

4. A numbered tag, bearing the year of vaccination, shall be furnished the owner and attached to collar or harness.

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"The Incurable Wound"

The Incurable Wound, feature article by the well-known medical writer, Berton Roueche, appears in the April 6 issue of *The New Yorker*. In this is presented factual evidence of the existence of rabies among bats in the United States and concludes that ultimate solution of the rabies problem is predicated on control and elimination of the disease in both domestic and wild mammals.

Nutria: Fur Bearer Of The Future

G. W. BAYLES, D.V.M., Marion, Illinois

NUTRIA (Spanish for otter) is a small fur-bearing, aquatic rodent native to South America. It has been bred in captivity in Argentina and in other countries of South America for 30 years. Large ranches in South America with herds numbering 15,000 animals have developed a standard for a desirable deep, dark fur. The wild species has been trapped to near extinction. Although introduced in the United States as early as 1930, little has been accomplished in quality for production until recently, when attention of some breeders and others interested was drawn to commercial potentials of culture. In 1938, a few animals escaped into a swamp region of Louisiana, and it is claimed that they have fared well and have multiplied rapidly. Fur of these is of such poor quality, however, that they are hardly considered worth pelting.

Improved Strains

Both in South America and in Germany high quality pelts have been produced. It is expected that interest in the culture of nutria will gain rapid momentum as demands for luxurious fur garments increase. Importation of superior fur producers have been made from both Europe and South America during the past five years. Pelts from improved strains are much like the finest beaver although lighter in weight. Coat colors of various shades have been developed by mutations, such as snow white, sand pastels, beige, ivory, jet black, et cetera.

Webster refers to the animal as coypu (*Myocastor coypus*) and the fur as nutria. The industry prefers the designation nutria for both animal and fur.

When adult, the nutria weighs 15 to 25 lb. They are characterized as having a tail resembling a muskrat, fore paws of a monkey, and orange tusks of a beaver. The hind feet are webbed. They are semi-aquatic and vegetarians.

Diet consists of cereal grains (corn, oats) alfalfa hay, carrots, fruits, and various vege-

Photo courtesy Nutria Del Rey, Inc., Pacoima, Calif.

tables. Potatoes and cabbage for some reason are claimed to be taboo. The flesh of the nutria is considered a delicacy.

Medical Problems

Few veterinarians have been presented with medical problems of nutria. The rodent appears to adapt itself well to environment and maintains essential good health under now accepted standards of cultural methods. Information on susceptibility to diseases is fragmentary. None of the common diseases suffered by mink, foxes, et cetera, appear to present problems. Information on parasitism is virtually nonexistent in this country, although Nutria Del Ray, Inc., Burbank, Calif. advise that an authoritative German text is being translated. Animals are clean, quiet, and free of obnoxious odor. Dogs and cats appear not to molest them.

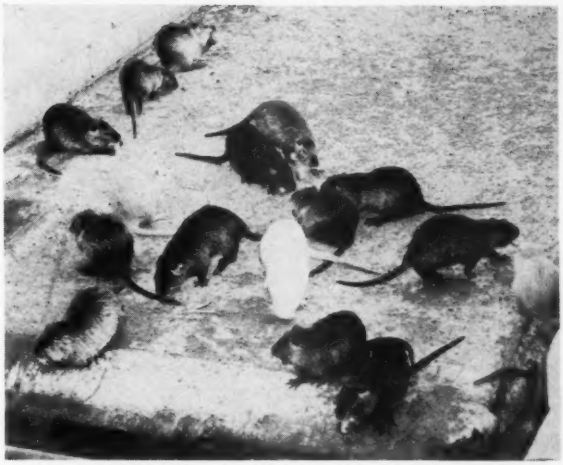
Breeding

Females can be bred at six to seven months of age. Usually two females and one male are housed together and mate for life. Gestation period is 135 days. Partum females breed back the day following partuition. Litters of six to eight are general. One female in a nearby ranch recently raised 15 of a litter of 18. Five litters are produced, as a rule, each two years of breeding life. Young are able to care for themselves within a few hours after birth and are weaned at five to six weeks of age. The breeding trio and young all appear to live in perfect harmony. They are rather docile, if not friendly. Never vicious, handlers move freely among them and they will eat from the hands of caretakers.

Pens for a trio of breeders and young are approximately 6 ft. x 12 ft. constructed of concrete and cement blocks. Walls 3 ft. high are all that is necessary for confinement. One end of each pen is partitioned for a shelter having a hinged roof. At the opposite end of each pen a depression is constructed approximately 18 in. wide, 12 in. deep which is kept filled with fresh water. These small reservoirs become contaminated since animals eliminate in the water, so that they must be drained and refilled daily.

Photo courtesy Nutria Del Rey, Inc.

Illustrating some of the nutria pens at Nutria Del Rey Ranch, Pacoima, Calif. Constructed of concrete blocks, walls are 3 ft. high, with 6 ft. x 12 ft. floor area. Fresh water is provided daily in a depressed reservoir at one end of each pen.



Nutria produce various colors of fur, including standard, golds, whites, and sand pastel. Note water reservoir bottom of illustration.

Photo courtesy
Nutria Del Rey, Inc.

Fur Harvest

Nutria ranching is not a "get-rich-quick scheme," however the writer is of the opinion that as a business venture in fur farming, nutria offers splendid opportunities. Starting with a single pair, the novice rancher should have at least 40 breeding females by the end of the third year's operations. By this time he should have acquired sufficient information relating to their habits and care to assure a profitable fur harvest by the end of the fourth year. Good quality pelts are selling from $15. to $25. each. If each female raised an average of 12 young per year, pelt harvest at the fourth year should approximate $12,000. This is considered to be a conservative estimate of potential and does not consider value of breeding stock now in demand. Breeding pairs are valued at $900. or more. Most breeders have not pelted stock and nutria garments on the market are made from South America and German pelt imports.

Some rather large companies have pioneered the growing industry and have done much to standardize management practices. Breeding animals are registered and ear tagged and sold with insurance to live and produce one litter within 12 months. Privilege of trading male babies exists among ranchers and is frequently contracted with a sale of breeding stock. Nutria Breeder's Association aid in operations including ear tagging, skinning, selection and marketing of pelts, and breeding stock. Skinning of nutria differ from the ordinary technic as the choice of fur in that on the ventral body surface. When pelted, nutria are split down the dorsal ridge.

Nutria is destined to take its place, probably a formidable one, in the fur industry during the coming decade.

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Treatment for Canine Distemper and Infectious Hepatitis

The differential clinical diagnosis of infectious canine hepatitis (Rubarth's disease) is still quite a problem especially when a single affected animal — probably the first one at the clinic — is presented. Not only is the clinical picture of hepatitis similar to that of canine distemper, but leptospirosis can not be readily excluded because both it and hepatitis frequently cause petechial hemorrhages in the buccal mucous membrane. The virus of hepatitis is present in the blood, urine, saliva, et cetera, and a diagnosis may be confirmed by inoculation of a distemper immune dog with the blood of a suspected case but this takes several days for conclusive results. The complement-fixation test gives quicker response. Since treatment is urgent, and since the differentiation has not been established between distemper and hepatitis it is frequently best to administer both canine distemper antiserum and infectious hepatitis antiserum, or antiserum prepared from animals hyperimmunized against both diseases which are specific therapeutic agents and antibiotics and sulfonamides to control secondary bacterial invaders. For prophylaxis a vaccine is available but appears to offer protection of limited duration, and therefor "booster" vaccination is frequently practiced. Furthermore, isolation and sanitation in kennels are a necessity to control spread.— *R. R. Dykstra, D.V.M.*

Hexetidine: A New Chemotherapeutic Agent For Topical Use

J. H. RIPPS, D.V.M., Asbury Park, New Jersey

SMALL animal practitioners are confronted almost daily with the proper selection of topical medicants for a variety of conditions which include dermatoses of all types, lacerations, cuts, otitis, and other similar disorders. The writer, over the past ten years, has not as yet found any one product that was effective against most or all of these common conditions. In continuing to explore this important phase of practice, clinical studies were initiated with a new agent, generically known as hexetidine (triocil®). This product was one of many hundreds submitted to the laboratories at Northwestern University[11] in an enzyme inhibition screening program.

Chemistry — Pharmacology

Chemically[1] triocil is identified as bis-1, 3-beta-ethylhexyl-5methyl-5 amino hexahydropyrimidine. Pharmacological[1] evidence indicates that the primary mode of action is effected by its interfering with vital metabolic processes necessary for bacterial growth. Thiamine antagonism and inhibition of oxidizing enzyme systems have been demonstrated. From clinical and laboratory work in both veterinary and human medicine, it appears that triocil exerts a greater antibacterial effect *in vivo* than *in vitro*.

Spectrum Activity

Laboratory[2,10] and clinical studies have demonstrated broad spectrum and antifungal properties as well as effectiveness against trichomonads and possibly other parasites. In the human field, clinical reports have been quite favorable in the treatment of vaginitis and/or cervicitis[3,4,5,6,7] as well as in those cases in which trichomoniasis[8,9] was a problem. The active ingredient has been found to be effective in low concentrations against *Streptococcus agalactiae, Strept. uberis,* and especially *Staphy-*

®Warner-Chilcott Laboratories, Morris Plains, N. J.

Summary of Results of Clinical Trials

Disease or Infection	Species	Relieved or Markedly Improved	Improved	Not Improved	Total Cases
Erythematous dermatitis, (acute)	Dog	4	1		5
Microgenic dermatitis	Dog	6			6
Gangrenous skin lesions	Dog	1			1
	Cat	1			1
Interdigital dermatitis	Dog	2			2
Erythematous and squamous crusted eczemas	Dog	5			5
Otitis, acute	Dog	6			6
Moniliasis (*C. albicans*)	Cat	4			4
Ringworm, common	Cat	1			1
"Scratches" (chronic)	Horse	3		2 (recurred two weeks later)	5
"Hot-spot"	Dog	1			1
Eczema, moist	Dog	4			4
Mycotic dermatitis	Dog	1			1
Interdigital cysts	Dog	1			1
Inflammation, eyelids	Dog		1		1
Suppurative dermatitis (acute)	Dog	1			1
Infected lacerations	Dog	1			1
"Collie-nose" (lesion)	Dog			2	2
Ulcer (lip)	Dog	1			1
Fungoid dermatitis (chronic)	Dog	3	2		5
Fungoid dermatitis (acute)	Dog	1			1
	Cat		1		1
Bite wounds	Dog	2			2
Furunculosis (chin)	Dog	1			1
Empyema (maxillary)	Dog	3			3
Caseous cyst	Parakeet	1			1
Vaginal discharge	Dog	1			1
	TOTALS	55	5	4	64
	Percent Response	86%	7.8%	6.2%	

lococcus aureus; Strept. hemolyticus, Corynebacterium pyogenes; in higher concentrations against coliforms and Pseudomonas. *In vitro* many fungi, including Tricophyton and Microsporum, are sensitive as are Candida, Crytococcus, Blastomyces, and Histoplasma in higher concentrations.

Triocil possesses the unique feature of having a strong affinity for tissue. This is believed to be a significant factor in its high therapeutic efficacy. It is relatively non-irritating and active in the presence of pus and pus formers. Attempts in the laboratory to produce resistance have not been successful. Tolerance is satisfactory in animals and was not a problem in human studies.[7,9,10]

Clinical Evaluation

Triocil in a liquid form was first evaluated in the large animal field in both mastitis and metritis, and later in topical infections. Several hundred reports were acquired and were favorable in regard to efficacy. Drury[12] found it particularly useful for staphylococcal infections in mastitis. In small animal studies results were equally gratifying. It was found to be effective in counteracting conditions due to resistant strains of Staphylococci and Streptococci. It was found to be highly effective and safe in cats in the treatment of fungus infections around the eyes and facial region. The cases studied were divided almost equally between acute and chronic. Ordinary treatment was carried out once per day, but in more serious conditions ointment was applied twice daily. Length of recovery time was shorter than that achieved with any of the common and well known ointments that have been available for the past several years. A few of the cases compiled are summarized as follows:

Summary

Triocil, a new synthetic agent with broad spectrum, antibacterial and antifungal properties as well as activity against certain parasites particularly trichimonads, is discussed. Reports from veterinarians in both small and large animal practice appear unusually promising. Toleration is satisfactory, and the variety of conditions responding to therapy is encouraging. It is believed that this product will prove useful, particularly as topical ointment, for a variety of condition where effective antibacterial and antifungal properties are desirable.

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Death Loss Experience in Dog Breeding

Observations in the Beagle-breeding colony established at the School of Veterinary Medicine, University of California are reported by Dr. A. C. Anderson (*Jour. Am. Vet. Med. Assn.*, 130:151 [Feb. 15], 1956).

High death losses occur during the transitional periods, *i.e.*, at birth and again at weaning. In this study which involved observations of 1,157 puppies whelped over a four-year period, 340 (29.4%) died during the first six weeks of life. Death rate was highest immediately following or shortly after birth, then a marked decrease inmortality was charted which rose again at the weaning age.

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Steatitis in Mink

Mink ranchers are still reporting the more or less sudden appearance of steatitis — inflammation of adipose tissue—in their charges. On autopsy there is found a characteristic yellowish-brownish discoloration of fat. The disease affects kits, it appears suddenly, there is inappetance and incoordination of the gait. Death usually is the end result. The condition is a nutritional disturbance associated with the consumption of a diet containing a high percentage of old storage fish scrap and horsemeat — these products have a high content of unsaturated fatty acids and a minimum of vitamin E. Handling of an outbreak consists in the reduction in the diet of storage fish and horsemeat and substituting fresh horsemeat and liver, with the addition of wheat germ oil for its vitamin E content, as well as, and for the same purpose, natural tocopherols (alpha, beta, and gamma) at the rate of 20 mg. daily, administered orally.—*R. R. Dykstra, D.V.M.*

Practical Test of the Efficacy of Piperazine Citrate in Pigeons

LEON F. WHITNEY, D.V.M.,
New Haven, Connecticut

From time to time, when I was a practicing veterinarian, homing pigeon fanciers brought me valuable racing pigeons for treatment. In all cases fecal examinations were made and it became clear that intestinal parasites are a major concern of homing pigeon fanciers whether they know it or not.

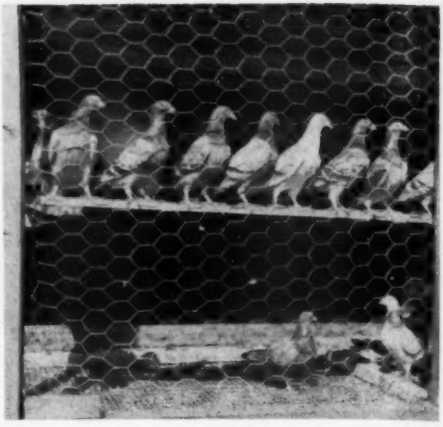
In attempting to evaluate the success of loft owners in racing their birds, I have found a correlation at least in the lack of success with a high parasite infection. In one instance, birds from an unsuccessful loft when transferred to another location where parasite control was practiced by attention to sanitary considerations; young from these birds became top racers in severe competition in their club. It is obvious that the most successful loft owners use wire bottom fly pens and keep their lofts so scrupulously clean that reinfection is kept at a minimum.

All of the homers which I obtained for my own loft have been tested for intestinal parasites. On these, piperazine citrate was used for the elimination of round worms before the drug was recommended to other homing pigeon owners.

Basing the dosage on the study of R. E. Bradley (*Vet. Med.* 50:444, [Oct.], 1955) in which he suggested as an optimum dose for broilers 8,000 mg. per gallon of water, a solution which the birds drank for 60 hours, I dosed 140 of my own pigeons. The first trial was during the squab-raising period (April and May). There were squabs as young as two days of age and others ranging up to those ready to leave the nests.

Twenty fecal examinations were made, each bird in a separate cage, and of these 18 revealed some degree of *Ascaridia columbae*, some with only one or two eggs per surface loop of centrifuged sodium nitrate solution, and some with 20 or more. With ascarid ova there was noted coccidia oocysts in every case, Capillaria ova in every case and ova of other species in several. We are interested here only in Ascaridae.

Water was removed in the evening. Next morning the 1½ gallon fountains were filled with a solution containing 12 gm. of piperazine citrate; the solution was changed each morning. At noon on the third day the solution was replaced with clear water.



Standard sanitary pigeon loft generally accepted by the fancy.

The birds began to pass round worms much sooner than was expected. Four were found under perches at one o'clock the first day, just four hours after the pigeons got their first draft of the solution. No effort was made to wash the worms from the balls of feces but it was obvious the deworming was successful both by the finding of many worms and by fecal examinations of the stools of the same 18 positive birds which had been previously examined. In the examination of all 18 only two Ascaridae ova were discovered. There was no diminution in the number of coccidia oocysts nor in the Capillaria egg count.

During the summer months, I dewormed my own pigeons four times, and again in December without ascertaining whether deworming was needed. Each time a few ascarids were found in the feces. New pigeons have been added from time to time and a few lost in flying but at least 120 birds have had five dewormings with 8 gm. piperazine citrate per gallon with no harmful results even to young squabs. Marked improvement in condition was observed.

Piperazine citrate has now been given to a number of other fanciers and used on their birds so that at least 1,300 homing pigeons besides my own have been treated once and some several times. No owner has reported any ill effects other than a little nausea, and all found worms under perches during treatment.

Conclusion

Over 1,400 homing pigeons have been treated with piperazine citrate, administered in

the drinking water, at the rate of 8 gm. per gallon. No harmful effects were noted even to young squabs. The drug was effective in the removal of the roundworm, *Ascaridia columbae*, but useless against *Capillaria columbae* and coccidia, as determined by before and after egg counts in fecal examinations made by centrifuged saturated sodium nitrate solution method.

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Operative Procedure for Spaying Cats

MARK STERNFELS, D.V.M.,
Mount Vernon, New York

Practitioners specializing in small animal practice are presented with female cats to be spayed. Newer anesthetic agents and simple surgical technics have minimized hazards of this operative procedure.

In our practice it has proved desirable for a number of reasons to practice presurgical preparation. Standard recommendation is that all patients be given dextrose (karo®[1] syrup) in amounts varying with weight and age. A 3 lb. kitten should be given a teaspoonful daily for two days; a mature cat two or more teaspoonsful twice a day for two days prior to surgery. This assists in assuring adequate blood sugar levels preoperatively. Water and food is withheld from evening preceding the operation.

Administration of Anesthesia

With an assistant holding the cat right side down, the operator places a stethescope over the heart of the animal during intraperitoneal injection of a measured dose of a 4% solution of thiamylal sodium (surital®[2]). Dosage of 1 cc. for each 5 lb. of weight is injected using a 24 gauge ½ in. needle between the seventh and eighth rib. Injection may be given rapidly.

Surgical anesthesia develops promptly without struggle, frequently in less than four minutes. If for some reason complete surgical anesthesia is not effected, an additional ⅓ dose of this barbiturate can be given to augment the first injection at the original site.

Patients generally remain in surgical relaxation for 16 to 30 minutes. There is neither pre nor postanesthesia struggle.

Operative Technic

The flank region is selected as the surgical site and three square inch area is shaved and otherwise prepared at the anterior angle of flank.

An oblique incision in the center of the shaved area is made about one inch long with a no. 10 scalpel through the skin and muscle. A puncture with a grooved directory is made through the peritoneum into the abdominal cavity. Using a spay hook and an aneurism hook, the puncture opening is enlarged to admit a spay hook readily.

The right ovary will be observed within ½ in. of the incision. Using curved Crile forceps, the ovarian artery is doubly clamped. Double Crile forceps are also clamped on the stump of the uterus and the opposite ovarian ligament. Tissues are severed between clamp and ligature indicated applied.

Peritoneal and the muscle layers are closed with size 1, type C, 20-day medium chromic boilable catgut by interrupted sutures. Sulfonamide solution may be used if parts are contaminated. Skin is sutured with interrupted twisted silk sutures.

No bandage or tape is placed over the wound and sutures are allowed to remain.

Summary

In a series of 100 cats spayed, successful results were noted in 99 employing intrathoracic anesthesia and the flank approach. One fatality was registered in a six-months-old Siamese whose previous history included a fight with a raccoon.

This standard spaying procedure is safe, economical, and may be accomplished speedily. The flank operation prevents danger of herniation. Patients generally remove sutures after first intention healing is complete.

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Fragility of Canine Semen

Canine semen seems to be a much more fragile substance when it is used in artificial insemination than is the corresponding bovine substance. At least it does not respond as well when the usual buffers that are employed as extenders in bovine semen are used. Research workers therefore advise that after the semen has been fractioned the second fraction be treated with milk in the ratio of one part semen to seven parts milk. By this method the life of spermatozoa has been extended so as to be 30% motile at the end of 140 hours. Successful fertilization is reported after such handling and storage.—*R. R. Dykstra, D.V.M.*

®[1]Corn Products Co., Chicago, Ill.
®[2]Parke-Davis & Co., Detroit, Mich.

Studies of Dengue Fever Virus in Mice (Hawaii Strain)

REGINALD L. REAGAN,* Major Ret. U. S. A., and
A. L. BRUECKNER,** V.M.D.
College Park, Maryland

According to Schwartzman[1] the virulence of poliomyelitis virus is enhanced in hamsters and mice after treatment with cortisone. The present study was undertaken to determine whether mice treated with cortisone could be made more susceptible to dengue fever virus.

The dengue fever virus strain (Hawaii mouse-adapted) used for this study was obtained from the American Type Culture Collection in Washington, D. C., and was submitted by Dr. A. B. Sabin of the Children's Hospital, Research Foundation, University of Cincinnati. Following its isolation in 1944, the virus was maintained for several serial passages in human volunteers and then was propagated in mice by intracerebral passages.[2] Lyophilized mouse brain of the 114th intracerebral mouse passage was received at this laboratory to initiate the experiment. In its present form the mouse-adapted virus is highly pathogenic when injected intracerebrally in mice of any age. Mice exhibit symptoms of central nervous system involvement five to seven days after inoculation with 10% suspensions.

Materials and Methods

Lyophilized mouse brain of the 114th intracerebral mouse passage was diluted to a 10% suspension with sterile distilled water. Each of eight three-week-old Swiss albino mice was inoculated intracerebrally with .03 ml. of this suspension. On the seventh day after inoculation the mice exhibited symptoms of central nervous system involvement. When symptoms appeared the mice were sacrificed, and the brains were removed aseptically. Pools of infected mouse brains were ground with alundum and diluted to 10% suspensions with physiological saline. The suspension was then subjected to five minutes' centrifugation in an angle centrifuge at 1,000 r.p.m.

The supernatant was used as the inoculum for all methods of exposure. The virus titrated 10^{-4} in Swiss albino mice inoculated intracerebrally. A virus neutralization test was conducted with specific rabbit dengue antiserum and normal rabbit serum, using mice as the test host, inoculated intracerebrally. Specific immune serum completely neutralized the virus, while normal rabbit serum did not. This confirmed the virus in the supernatant material to be dengue fever virus.

TABLE 1. Response of Swiss Albino Mice to Dengue Fever Virus after Administration with Cortisone Acetate

Route of inoculation	No. exposed	Amt. cortisone administered mg.)	Dengue fever virus time given	No. exhibit. sym.	Days
IP	6	1	1 hr. later	0	
R	6	1	1 hr. later	0	
ID	6	1	1 hr. later	0	
IC	6	1	1 hr. later	0	
IM	6	1	1 hr. later	0	
IL	6	1	1 hr. later	0	
IO	6	1	1 hr. later	0	
IC	6	1	1 hr. later	6	7
IN	6	1	1 hr. later	0	

IP=intraperitoneal; R=rectal; ID=intradermal; IC=intracardial; IM=intramuscular; IL=intralingual; IO=intraocular; IC=intracerebral; IN=intranasal.

One hundred eight Swiss albino mice (three-week-old females) were divided into 18 groups of six animals each. The mice of groups 1 to 9 were administered 1 mg. of cortisone acetate (lot no. 03C 9204 Merck Co.) in the muscle, and one hour later were given the virus by one of the following methods: Intracerebral, intraperitoneal, intradermal, intramuscular, intralingual, intraocular, and intracardial injections, and rectal and intranasal instillations. The inoculum consisted of 0.06 cc. for all routes of exposure as shown in table 1 except for the intracerebral, intraocular and intranasal groups where the inoculum was 0.03 cc. The albino mice of groups 10 to 18 were not given cortisone acetate but were treated in like manner with the virus suspension as shown in table 2. After inoculation all groups were observed twice daily for nervous symptoms. If they appeared, the animals were sacrificed, the brains were removed and ground to 10% suspensions with physiological saline. The virus contained in these suspensions was confirmed to be dengue fever virus by neutralization tests done intracerebrally in Swiss albino mice. All mice were held 21 days and then discarded.

Discussion

Table 1 shows the response of Swiss albino mice given cortisone acetate in the muscle and one hour later dengue fever virus by various routes. The group inoculated intracerebrally developed nervous symptoms characteristically

*Professor of Virus Diseases; **Professor and Director of Live Stock Sanitary Service, Virus Laboratory, Live Stock Sanitary Service, University of Maryland.

found in mammals infected experimentally with this virus. The remaining groups exhibited no symptoms.

Table 2 shows the response of Swiss albino mice inoculated with dengue fever virus by various routes. No cortisone acetate was administered to these mice, and therefore, they acted as a control. The group inoculated intra-

TABLE 2. Response of Swiss Albino Mice to Dengue Fever Virus

Route inoculation	No. animals exposed	No. exhibit. symptoms	Days
Intraperitoneal	6	0	
Rectal	6	0	
Intradermal	6	0	
Intracardial	6	0	
Intramuscular	6	0	
Intralingual	6	0	
Intraocular	6	0	
Intracerebral	6	6	7
Intranasal	6	0	

cerebrally exhibited nervous symptoms characteristically found in mammals treated experimentally with this virus. The remaining groups exhibited no symptoms.

Summary

Swiss albino mice treated with cortisone acetate and Swiss albino mice given no cortisone acetate showed no marked difference after exposure to the dengue fever virus (Hawaii mouse-adapted). The groups inoculated intracerebrally developed nervous symptoms characteristically found in mammals infected experimentally with dengue fever virus. The virus contained in these brains was confirmed to be dengue fever virus by neutralization tests done in Swiss albino mice intracerebrally.

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Glaucoma Therapy

Ophthalmologists of the Wills Eye Hospital, Philadelphia, report that of a sizeable group of eyes treated, the glaucoma in a major portion was successfully controlled with phospholine iodide given only once daily. —*Medical News*, 4/8/57.

Dogdom's Man of the Year

Dr. James B. Baker (r.), Director of the Cornell Laboratory for Diseases of Dogs, Ithaca, N. Y., receives plaque as Dogdom's Man of the Year 1956 from Harry Miller, Director of the Gaines Dog Research Center. Doctor Baker was cited for his great contribution to the health and well-being of dogs. His selection followed balloting by various elements in the dog field from nominations submitted by a committee of leading dog editors and writers. He was voted Veterinarian of the Year in a similar poll in 1952.

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Nomination Invited for Gaines Award

A new award to foster progress in the field of small animal medicine and surgery by encouraging and recognizing achievements in that field has been approved for A.V.M.A. administration. The first of the annual awards consisting of a gold medal and $1,000. in cash will be presented at Cleveland in August.

Winners will be selected by a special *ex officio* committee of the Association which will consider nomination made by anyone. These should be addressed to: Committee on Gaines Award, A.V.M.A., 600 S. Michigan Ave., Chicago 5. Nominations must be received not later than June 1, 1957. Eight copies of brief data to include description of work done and other pertinent information of the nominee must be furnished the Committee. Awards will be presented at the opening session of the Cleveland convention.

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Recent action by the Colorado legislature has changed the name of Colorado A. & M. College, Ft. Collins. Effective May 1, 1957, this institution, including the School of Veterinary Medicine, becomes Colorado State University.

Report of the 24th Annual Meeting of the American Animal Hospital Association — San Francisco, California May 8-11, 1957

Just 24 years ago (1933) a group of practitioners interested in the medical care of small animals met during the sessions of the American Veterinary Medical Association convention to found what has developed to be a strong motivating force in veterinary medicine. Those charter members established a set of elevated standards for professional service and hospital facilities in the care and treatment of dogs, cats, and other pet animals.

Annually since its foundation, the American Animal Hospital Association has scheduled a separate three-day meeting (the A.A.H.A. supports the Small Animal Section at A.V.M.A. conventions) during which many facets of the business of providing better veterinary service for pets are discussed. In addition, program committees generally poll the membership carefully to determine current medical problems. On this advice, best qualified authorities are engaged for technical discussions.

The results have been dramatic, and often rated as superior postgraduate courses in small animal medicine and surgery. Growth of the organization has been steady as interest in the movement gained momentum. From a faithful visionary few, the American Animal Hospital Association has grown to an active membership of 337 hospitals. Represented in these figures is the gain of 30 member units over a year ago. Besides active member hospitals (which means considerable more than 337 individual veterinarians, since some directors include all or a portion of their technical staff as active members) there are 14 past active and 30 associate members. This year of growth reflects the normal average of the past ten or more years, an average gain of between 25 and 50 annually.

A byproduct of significant value is the *camaraderie* among members which has encouraged not only exchanges but cooperation between hospital establishments.

The scope and usefulness of this group recently has been given more attention which is reflected by publication of many technical papers in widely circulated journals. Sectional meetings, scheduled in various regions during the fall and winter months, have also served the purposes of the organization for advancement of professional technics and standardization of practices. At all its meetings, the A.A.H.A. has provided facilities for all those interested in discussion. Attendance might be double the membership at any single meeting.

Dr. William G. Magrane, MSC '40, in partnership With his brother Harry J. Magrane II, TEX '43, operates an extensive small animal practice at Mishawaka, Ind., originally established by their father Dr. Harry J. Magrane, MCK '13, now retired. Dr. William G. Magrane has pursued the specialty of canine ophthalmology in his practice for some years and in 1955 entered the graduate School of Medicine, University of Pennsylvania, where he received an advanced degree in ophthalology.

At San Francisco

Approximately 450 veterinarians attended the well planned sessions at San Francisco. Total registration, which included guests and exhibitors, reached 750. Dr. Norman L. McBride, program chairman, and his committee chose speakers with care and scheduled technical discussions from the rostrum. Short-circuit television demonstrations gained audience appeal and appreciation. This year's program was characterized by practical and useful

clinical material effectively presented both in discussion and demonstration. Television was provided through the courtesy of Allied Laboratories, Inc. and Radio Corporation of America. President James W. Yarborough, Miami, Fla., presided.

Awards

For some years a contest, first introduced by Dr. Floyd Moss, Colorado State Universary, Ft. Collins, has been conducted by the association which invites senior students to prepare an essay on ethics for competition, the prize being an expense-paid trip to the convention and cash prizes. Topic chosen for this year's contest was "Ethics — How will it Pay a Veterinarian?"

Mr. Lawrence G. Clark, senior veterinary student at the College of Veterinary Medicine, University of Illinois, was judged Moss Essay Contest winner for 1957. He presented his essay at the opening session. Mr. Donald W. Henness, School of Veterinary Medicine, Colorado State University, was reserve winner.

This year two new awards were presented for the first time at the A.A.H.A. meeting. The Mark L. Morris Animal Memorial Foundation honored Dr. J. V. Lacroix of Evanston, Ill. for outstanding professional service in the field of small animal medicine with a plaque of recognition and a monetary award. In presenting the award to Doctor Lacroix, Dr. C. W. Bower recalled over a half century of distinguished service to the profession, both as publisher and pioneer in small animal medicine. A prolific writer on subjects of interest to small animal practitioners, Doctor Lacroix's career has exemplified the qualities that demand recognition and assure him a place in the upper circle of those who have earned a niche in the veterinary hall of fame. Doctor Bower concluded as follows: "With this award is extended your profession's appreciation for your good work." As he accepted the handsome plaque, Doctor Lacroix received a standing ovation as token recognition from those assembled.

The Veterinarian of the Year Award, annual honor sponsored by the Gaines Dog Research Center and previously presented at the Westminster Kennel Club show at New York, was this year presented at the San Francisco A.A.H.A. meeting. Dr. Jack Knowles, practitioner, Miami, Fla. was selected as 1957 award winner of the traditional "Fido" figurine and cash. Both the Gaines award of Veterinarian of the Year and the Mark L. Morris Animal Memorial Foundation award are expected to be featured at subsequent opening sessions of annual meetings.

Officers

Officers selected to serve the group for 1957-58 are as follows: Dr. Joseph A. S. Millar, Deal, N. J., president; Dr. William G. Magrane, Mishawaka, Ind., president-elect; Dr. William K. Riddell, Los Angeles, Calif., vice president; and Dr. Ralph E. Ruggles, Moline, Ill., treasurer. The secretary's office is filled by an executive secretary engaged by the Executive Board. Dr. Wayne Riser was reengaged for this important post.

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Small Animal Veterinary Medical Association Formed in England

Over 80 veterinarians meeting at the Royal Veterinary College, Camden Town, London, added a new chapter to the colorful history of the veterinary profession in that country. At this meeting the British Small Animal Veterinary Association was founded. The new organization is restricted to members of the veterinary profession whose work is chiefly with the household pet, particularly the dog and the cat.

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Bat Rabies

From an article in the *Archives of Pathology*, Mar., 1957 it is learned that rabies was transmitted experimentally from artificially infected bats (a species not subsisting on blood) to suckling Syrian hampsters bitten by them. The bats were inoculated with rabies virus, then permitted to bite the hampsters with the result that 50% of 26 bitten hampsters exhibited symptoms in ten to 14 days. Saliva from more than half of the bats used in the project was demonstrated to contain the virus. The previous recovery of rabies virus from insectivorous bats was announced a few years ago. —*R. R. Dykstra, D.V.M.*

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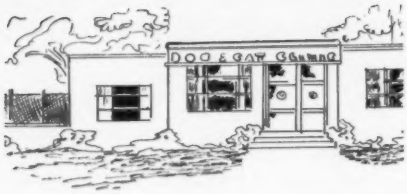
At the turn of the century, the pharmaceutical industry was expected to make at least one major advance in medical agents every 25 years. Today, 50 years later, at least one significant advance is expected every six months, so rapid has been the expanded knowledge in many classes of drugs.



CLINIC

CLIFFORD L. McGINNIS, D.V.M.
Peoria, Illinois

AN old couple living on a farm near our office have seven cats, and I had been seeing one or more occasionally, as the need arose. Their only income was the old-age pension, but they loved those cats and spent more for their food and care than they spent on themselves. They were the type who wear two old dirty overcoats at one time. They were also the "God bless you, doctor" kind that we all see once in a while.

Well, both the oldsters came in with an aged yellow cat that had a swelling over the gluteal region. I believe it to be the usual cat-fight abscess, but on careful examination and effort to drain the swelling proved to be a mass of tissue from which only a small amount of debris and pus could be withdrawn. Although liberal amounts of antibiotics were given parenterally for the next three days, this swelling tripled in size. Clinically, it resembled a malignancy, so I advised euthanasia. The owners expressed reluctance and decided to take the cat home. We haven't heard from them since.

Maybe it was an organized abscess and not a malignancy, but I was trying to save my clients fees for surgery and after care. They were quite unhappy that we hadn't affected a cure, and then I remembered that few pet-owner appreciate a veterinarian saving their money. I should have had a biopsy report and kept the cat under observation a few more days.

The Cat Patient

Cats are interesting to work with. They certainly will not stand restraint and I have never found it necessary. On the examination table, just let them stay "loose." Sort of herd them.

Do not try to force the rectal thermometer. Insert it a little way, wait a few seconds and further insertion becomes easier. If you need restraint, place the cat in a cage and in the morning give it 1½ gr. capsule of nembutal® orally. I have never had a fatality from this procedure, and 90% of the cats will subside to surgical anesthesia. For the few that need additional anesthesia, it is no problem to inject the cephalic vein with a little additional nembutal solution after a wait of at least 30 minutes. The only disadvantage is that the patient can not be discharged the same day. Still it is no problem to return the patient to a comfortable cage after surgery is completed; by the following day complete recovery is the rule. This type of anesthesia saves both time and manpower and is ideal for the short-handed practitioner.

Notes on Antibiotics

We see a condition in cats, differentiated clinically from panleucopenia, distemper, and pneumonitis. Body temperature is elevated to 102 or 103 F. A soft cough is present and a rhinitis and conjunctivitis is obvious. We give penicillin with streptomycin and have the cat returned in 24 hours for an additional treatment if needed. Recovery occurs promptly but immunity, if any, induced by attack, is transient. It may recur in 30 to 60 days.

Cats do not tolerate streptomycin as do dogs. We have observed some muscular incoordination following large doses.

Urethral Concretion in Tomcats

By using a blunt pointed 20 gauge, 1 in. hypodermic needle, attached to a 5 cc. glass syringe filled with water or saline solution, we are generally successful in repelling urethral obstructions into the bladder. Many times the urethra will be stopped up again the next morning but every day that the bladder can be emptied normally, chances for survival are enhanced. If one can avoid the severe toxicity that occurs with urethral occlusion, then surgical intervention is more apt to be successful.

The new mastitis preparation containing neomycin, penicillin and polymyxin marketed under the trade name special formula no. 17900 is the first preparation I have found that can be easily instilled into the nostrils of cats and dogs. It gives some relief in the severe pustular rhinitis. We are also using it to inject infected anal glands of dogs.

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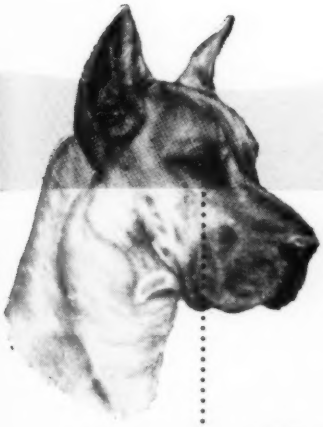

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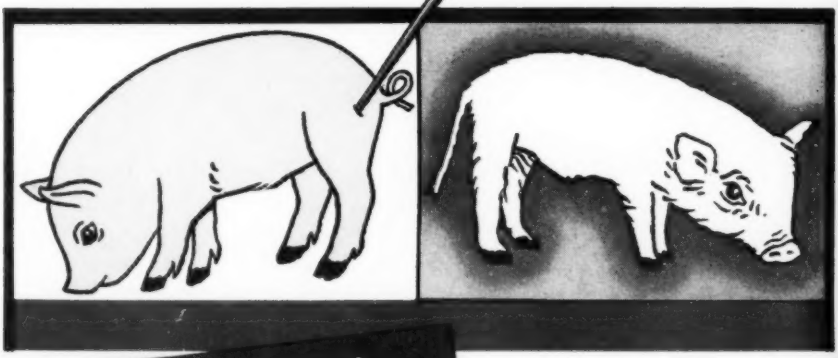

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Infectious Sinusitis Of Turkeys Caused By Antibiotic Resistant Pleuropneumonia-Like Organisms

J. E. FAHEY,* M.A., Ph.D., Toronto, Canada

THE most favorable results in the treatment of infectious sinusitis (IS) of turkeys have been obtained with antibiotics. Streptomycin at a level of 100-150 mg.[1-5], aureomycin®[1] at a level of 50 mg.[3-5] and terramycin®[2] in oil at a level of 3.125 mg.[5] have been used successfully in the treatment of this condition. It is now generally considered that the causative agent of IS is a pleuropneumonia-like organism (PPLO).[10, 11] The purpose of this paper is to outline a field outbreak of IS due to PPLO resistant to streptomycin and partially resistant to aureomycin and terramycin.

This outbreak occurred in a group of 380 Broad Breasted Bronze turkey poults started in early spring. The clinical history of this flock is presented in summary in table 1. At five weeks of age a respiratory disease was observed in the flock and this was accompanied by IS in 12 birds. These were treated with streptomycin sulfate (100 mg./sinus) by a feed service man with no subsequent response. In the ensuing weeks, the disease spread steadily throughout the flock. The birds were treated again at 8, 11, and 15 weeks with the same antibiotic at the same level. The failure of the treatment at 15 weeks resulted in the advice of the laboratory being sought.

When the flock was first visited at 15 weeks it was apparent from the history that the disease appeared refractory to streptomycin. To test this hypothesis as well as to determine if terramycin or aureomycin would be of value, a field experiment was conducted. Fifty birds were selected at random and each of four groups of ten were treated as indicated in table 2. The fifth group served as controls. In each case the dosage indicated was injected into all sinuses showing indication of swelling and the sinuses were drained at the time of treatment.

From the results obtained it appeared that a combination of aureomycin and terramycin each at 50 mg. per sinus offered the best chance of success. Accordingly, at 19 weeks of age 143 birds were treated with this mixture and within two weeks the sinusitis had disappeared in all but 24 birds, which corresponds to a recovery of approximately 84% of the birds treated. Those which did not respond were treated again with the same mixture with poor results, since 18 of these were not cured. At killing time (27 weeks) there was some recurrence since 25 of a surviving 260 birds showed evidence of sinusitis. This number included the 18 shown to be refractory to treatment, since these latter birds were separated. Failure of the treatment in these cases was not due to caseation of the sinus exudate since such caseation did not occur. The total mortality from 4-27 weeks was 29 birds.

Apart from the treatment outlined in table 1 the birds were alternately fed aureomycin and terramycin at 200 gm. per ton of feed intermittently from 12-17 weeks in an effort to enhance appetite since general condition was poor at this time. This procedure may have been partially responsible for the development of resistance to these antibiotics.

Sera obtained from the birds when 12 and 17 weeks of age were checked for Newcastle and PPLO hemagglutination-inhibition (HI) antibodies.[13] No Newcastle antibodies were detected but the sera from all birds tested were found to possess high levels of PPLO H-I antibodies on both occasions.

Laboratory studies on the above outbreak were concerned with the determination of both *in vivo* and *in vitro* sensitivity of the organisms. Eighteen 12-week-old turkeys from stock free of IS and containing no PPLO H-I antibodies were used in the infection experiments. Exudate from field cases was pooled and incubated for two hours with equal volumes of streptomycin sulfate dilutions. Each turkey was injected with the exudate-streptomycin mixture, the groups of six receiving respectively 500, 250, 100 mg. streptomycin per sinus. In this experiment it was observed that the exudate produced IS in all turkeys so treated and streptomycin at levels up to 500 mg./sinus did not prevent the development of the sinusitis. After the sinusitis had developed,

*Connaught Medical Research Laboratories, University of Toronto.
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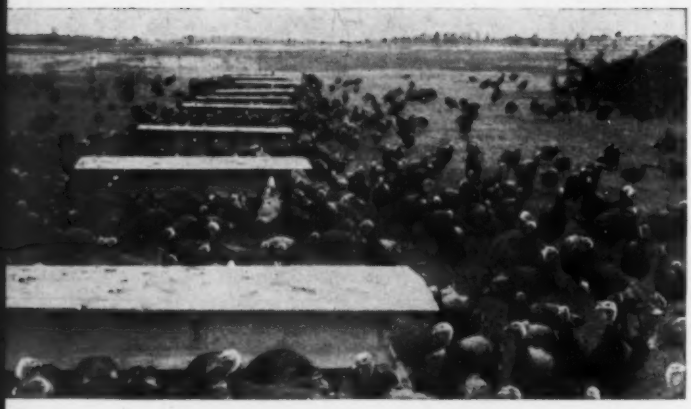
®Chas. Pfizer Co., Brooklyn, N. Y.



Infectious diseases in flocks and herds are the limiting factor in profitable production of meat foods.

nine of the birds were treated with 500 mg. streptomycin in each infected sinus and the remaining nine with the terramycin-aureomycin mixture (50 mg. of each antibiotic/infected sinus). The sinuses were drained prior to treatment and of those birds treated with terramycin and aureomycin, two of 9 subsequently had a recurrence of sinusitis. However, of those treated with streptomycin, the sinusitis recurred in all nine birds within one week. All 18 birds, including those successfully treated, developed PPLO H-I antibodies.

In the determination of *in vitro* sensitivity, organisms isolated from field cases, as well as from the experimentally infected birds were used. Although the organisms were isolated from 17-20 of the exudates tested, only four isolations were used in the tests, three of these being from field cases. The media and technics employed in this study have been previously described.[13]

A series of phenol red broth tubes containing varying concentrations of the antibiotics to be tested were seeded with organisms. A duplicate series of cultures in medium containing 0.5% maltose were also prepared. In determining whether or not growth of the PPLO occurred, utilization of maltose was taken as the main criterion, although ability to be passaged was also tested. In the maltose tubes, growth was considered to have occurred if a color change resulted within one week, and in the plain broth, if growth occurred when the organisms were subcultured after one week to maltose tubes. Smears were made of all tubes considered positive to ensure that the morphology of the organisms was typical of PPLO. Two of the cultures were also checked

TABLE 1. A Summary of the Observations made on an Infected Flock of 380 BBB Turkeys

Age of Birds (Wks.)	Clinical Condition	Number Treated	Treatment*	Remarks
2	Overheating	all	Terramycin 200 gm./ton for 1 week	Loss of 91 birds during 2-4 weeks
5	Respiratory Disease + IS	12	Streptomycin** 100 mg.	No response reported
8	IS	40	Dihydrostreptomycin 100 mg.	" " "
11	IS	65	PS*** (100 mg.) streptomycin	" " "
15	IS	104	PS (150 mg.) streptomycin	" " "
17	IS	40	See table 2	See table 2
19	IS	143	Terramycin 50 mg. + aureomycin 50 mg.	84% recovery
21	IS	24	"	6/24 cured
27	IS	25		Some recurrence in treated birds

*Terramycin and aureomycin fed intermittently from 12-17 weeks.
**Indicates amount into each infected sinus.
***PS = Penicillin G procaine 60,000 units; penicillin G potassium 20,000 units; streptomycin sulfate 100 mg. in this ratio.

TABLE 2. Treatment of Turkeys Infected with Sinusitis with Antibiotics

Antibiotic	Dosage	No. Cured/ No. Treated
Dihydrostreptomycin Sulfate	200 mgm.	0/10
PS*	200 mgm. streptomycin equivalent	0/10
Aureomycin	50 mgm.	3/10
Terramycin	50 mgm.	4/10
Controls		0/10

*See table 1.

TABLE 3. *In vitro* Sensitivity to Antibiotics of Four Isolates of PPLO from a Flock with Infectious Sinusitis

Antibiotic	Amount Antibiotic/ml. (mcgms.)	Isolation No. 1.	2.	3.	4.
Streptomycin sulfate	0	+	+	+	+
	5	+	+	+	+
	25	+	+	+	+
	100	+	+	+	+
	200	+	+	+	+
Terramycin	0	+	+	+	+
	0.5	+	+	+	+
	5.0	+	—	—	+
	25.0	—	—	—	—
Aureomycin	0	+	+	+	+
	0.5	+	+	+	+
	5.0	+	+	+	+
	25.0	—	+	—	—

+ = growth; — = no growth.

for hemagglutination (HA) activity after serial passage and were found to be positive. The HA activity of these cultures could be neutralized by standard PPLO antisera. The results of one *in vitro* antibiotic sensitivity test is shown in table 3.

As a final check to ensure that the organisms isolated and studied *in vitro* were indeed the cause of the sinusitis observed, each of the four isolations was tested in turkeys after five serial passages in broth. In each case infection of a susceptible turkey with these organisms resulted in a sinusitis.

Discussion

The finding of a strain of PPLO which is resistant to streptomycin and causing infectious sinusitis in a turkey flock raises the question of the importance of such strains. In the outbreak reported it would appear that the strain was initially resistant since the streptomycin given in the first treatments should have been sufficient to eliminate the disease symptoms. The streptomycin may, however, have merely acted as a selective agent and allowed the resistant mutant to spread. It is certain that by the time the laboratory studies were begun all turkeys were infected with the resistant type. It is easy to visualize that if this strain were to affect a breeder flock, it would probably result in a fairly quick and widespread dissemination of a resistant strain. Since there are no reports in the literature of IS being completely refractory to streptomycin, one might conclude for the present that the development of streptomycin-resistant strains is only a potential problem, but nevertheless one that must be watched for by those whose work involves the treatment of sinusitis. The danger of feeding antibiotics to turkeys with sinusitis should also be noted since in this present case, such a procedure appears to have contributed to the development of a strain of PPLO partially resistant to aureomycin and terramycin.

Summary

An outbreak of infectious sinusitis, due to an antibiotic-resistant strain of PPLO, is described.

Both *in vivo* and *in vitro* studies indicated that the strain was partially susceptible to terramycin and aureomycin. A mixture of these antibiotics was moderately successful in controlling the outbreak.

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(Continued on page 309)

A Bacterin for Use in Swine Herds Affected with Virus Pneumonia

G. R. CARTER,* D.V.M., M.S., D.V.Sc., Guelph, Ontario, Canada

Virus pneumonia of pigs (VPP) is widespread in the principal swine raising districts of the world. Recent observations[1,2,3] have disclosed that VPP is widespread in Canada and the United States.

Some indication of the wide distribution of the disease can be obtained from the examination of lungs of market pigs at slaughter. The examination of these organs from a number of packing houses in Ontario has revealed a large percentage of pigs infected with this disease.

Observations made in the diagnostic laboratory of the Ontario Veterinary College have shown that *Pasteurella multocida* is by far the most important secondary invader. That such is also the case in other countries is indicated by the number of cultures of *Past. multocida* from swine pneumonia that have been sent to the author for typing.

It is also of interest that experimental evidence supports the view that uncomplicated VPP is usually a benign disease.[3] However, the uncomplicated disease would appear to be the exception rather than the rule.

The serological examination of a large number of strains of *Past. multocida* from swine pneumonia has shown that two principal types occur, *viz.* types A and D. The geographic distribution of these types is given in table 1. Details in regard to the typing of these strains will appear elsewhere.[4]

Because it was considered that one or two inoculations of a bacterin might increase resistance to secondary Pasteurella infections, a bacterin prepared from types A and D has been prepared on an experimental basis at the Ontario Veterinary College. This bacterin has been employed in herds where VPP has become a serious problem. Its use is aimed at reducing the severity of the infections and consequently decreasing the feeding period. The greatest economic loss attributable to VPP is that of loss of weight gains.

Although substantial experimental evidence to support the efficacy of this new bacterin is not available at present, practicing veterinarians who have employed the agent selected in herds feel that it has real value. Because of this and because the preparation of the bacterin is based on actual bacteriological findings it is felt that this preliminary note is justified. A number of field trials are being carried out in southern Ontario.

It is worth noting that some firms preparing mixed porcine bacterins include in the formula a strain of *Past. multocida* of buffalo origin. An examination of many buffalo strains has disclosed that generally speaking they are serologically type B. Their inclusion in mixed porcine bacterin prepared for use in North American swine has no rational basis as will be pointed out in a subsequent report.[4]

Considerable care has been taken in the preparation of the experimental bacterin. Should this bacterin be prepared commercially it is felt that attention should be directed to the following:

1. Only freshly isolated, capsulated cultures of types A and D should be employed for each lot of bacterin. (Lyophilized cultures of freshly isolated strains of types A and D can be obtained from the author.)

2. It is well known that short incubation periods favour maximum antigenicity. A six

*Ontario Veterinary College.

Fig. 1. Lesions of chronic pneumonia complicated by *Pasteurella multocida* infections observed in market hogs at slaughter.

TABLE 1. Distribution of Serological Types of *Past. multocida* Recovered from Cases of Pneumonia of Pigs

Geographic Source	No. exam.	Type A	Type D
Alberta	78	44	34
Australia	8	6	2
France	3	2	0
Georgia	4	1	3
Illinois	5	1	4
Iowa	4	1	3
Ontario	23	19	4
Wisconsin	6	1	5
Quebec	4	2	2
Totals	135	77	57

to eight-hour period has been found to produce a satisfactory harvest of organisms.

3. It is not necessary to add more than 0.25% formalin by volume in order to sterilize the bacterin cultures.

The dosage recommended for the experimental bacterin has been as follows:

1. 3 cc. between five and ten weeks of age.

2. A second dose of 5 cc. after an interval of at least a week. The optimum time for the first dose appears to be five to six weeks of age.

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▼ ▼ ▼

Rocky Mountain Spotted Fever

This seasonal disease is not limited to the Rocky Mountain area of the country but is widespread, occuring in all western states and some Atlantic Seaboard areas.

Many species of ticks may serve as disease vectors. Only one, *Dermacentor variabilis*, is widely distributed on North America. It has the dog as its principal host, although man and other mammals may be attacked. The tick is not affected by the causative rickettsial etiological agent of Rocky Mountain spotted fever but serves doubly as infection reservoir and vector; the latter by biting and feeding on the mammalian host. In dogs, infection is mild and inapparent; in man onset of disease is abrupt, with chills, fever, and malaise. Persistant fever and cutaneous eruptions may appear as dependable clinical signs.

Most effective prophylaxis is prevention of attachment of ticks and prompt removal in the event of attachment. Method of removal is also important. Frequent inspection of the entire skin area and especially the scalp of children, hunters, and fisherman, who may be exposed to tick infested woods is recommended. Application of irritants to ticks, such as kerosene, chloroform, iodine, and others, and removal with tweezers to avoid crushing is also emphasized. Ticks should be destroyed by burning. Dogs should be kept parasite free by approved dipping procedures, attention being given to bedding and sleeping quarters to avoid reinfestation.

Despite its gradual decrease in incidence, during recent years, Rocky Mountain spotted fever is a serious disease in the United States.

▼ ▼ ▼

Scientists are concerned about the threat of today's counterattack by insecticide-resistent insects and drug resistance of pathogenic organisms.

In these fields, more fundamental information on which to base progress of applied research in the years ahead is necessary. Further delay means needless exposure to dangerous risk.

▼ ▼ ▼

Animal disease authorities of Great Britain, where scrapie has become endemic and where it has resulted in great losses to the sheep industry, advise livestock disease specialists that an eradication policy such as planned for the United States, where the disease has not become firmly established, is the best procedure in the light of present knowledge concerning medical management.

▼ ▼ ▼

Infectious Sinusitis of Turkeys

(Continued from page 307)

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Failure of Infected Ducks to Transmit *Leptospira pomona* to Calves†

S. G. KENZY, D.V.M., Ph.D., and
R. W. H. GILLESPIE, Ph.D., Pullman, Washington

Cattlemen have been concerned about the possibility of wild waterfowl serving as a source of leptospiral infection for cattle. In certain areas of Washington, extensive leptospirosis outbreaks have been observed in cattle during the time that large numbers of migrating waterfowl were observed on the lakes, ponds, and rivers.[1]

Study of sera from chickens on a ranch where bovine leptospirosis was epizootic indicated that agglutination-lysis (a.l.) antibodies for *Leptospira pomona* could be readily demonstrated.[2] Antibodies for *L. pomona* developed when water contaminated with urine from a cow with leptospiruria was fed to chickens and ducks.[3,4] In preliminary trials, no evidence of Leptospira could be detected in the excreta of either the chickens or ducks.[3,4]

This report concerns the study of calves exposed to ducks infected with *L. pomona*.

Methods

The Leptospira-containing urine employed in this study was obtained from two six-month-old heifers which were exposed twice daily for three days with a culture of *L. pomona*,* through the nasal and ocular routes, as described by Gillespie and Kenzy.[5] When leptospiruria occurred at the rate of approximately 1,000,000 organisms/ml. of urine, contamination of the ducks' drinking water was initiated. Urine specimens were treated as previously described.[4,5] From 300 to 900 ml. of urine were collected twice daily over a period of 30 days. Further dilution with tap water was carried out immediately in a metal trough 3½ ft. x 2 ft. x ½ ft. to give a final dilution of about 1:40. Additional diluted urine was added twice daily without cleaning the water trough unless excessive foreign debris was present. Twenty ducks, one to four months of age, were allowed free access to this water.

Pre-exposure sera from the ducks were negative for agglutination-lysis (a.l.) antibodies against *L. pomona*. Thirty-eight days after access to Leptospira contaminated water, seven of the 13 ducks with a.l. antibodies for *L. pomona* were transferred to an isolated pen with four calves. A water trough, like that described above, was partially fenced off by a gate so that the ducks had an opportunity to swim without interference from the calves. Calves obtained drinking water from a corner of this trough.

Before exposure, the four calves (four to nine months of age) used in this study were seronegative for *L. pomona* on two successive bleedings at 30-day intervals. Daily rectal temperatures of the calves were recorded over a period of 20 days before and 24 days following exposure. Sera for the a.l. test were collected at weekly intervals. Specimens of drinking water were collected periodically for inoculation of weanling hamsters and/or guinea pigs.

†From the Washington Agricultural Experiment Station, Department of Veterinary Science and Department of Veterinary Microbiology, College of Veterinary Medicine, State College of Washington. Scientific Paper no. 1566, Project no. 1176.

*The REA strain was isolated 11-14-53 by culture of the peritoneal fluid from a guinea pig inoculated with urine from a bovine shedder. Acute cases and deaths due to leptospirosis were diagnosed on this ranch by Dr. P. M. Aldrich, Walla Walla, Wash., the herd veterinarian. Since the original isolation this strain has experienced several alternate bovine and hamster passages, as well as storage in a dry ice chest, without any apparent decrease in virulence for cattle.

TABLE 1. Serologic Reactions in Ducks Having Access to Water Contaminated with Bovine Urine Containing Leptospira*

Duck no.	Days Following Exposure: 0		20			34			76			103			140		
	10^{-1}**	10^{-1}	10^{-2}**	10^{-3}**	10^{-1}	10^{-2}	10^{-3}	10^{-1}	10^{-2}	10^{-3}	10^{-1}	10^{-2}	10^{-3}	10^{-1}	10^{-2}	10^{-3}
3	—***	+§	+	—	+	+	+>	+	+	I	+	+	I	I	I	I
7	—	—	—	—	+	+	I§§	+	—	—	+	+	I	+	—	—
11	—	W§§§	W	—	+	+	+>	+	+	+>	+	+	I	+	I	I
13	—	+	+	—	+	+	+>	+	W	I	+	+	I	+	I	I
16	—	+	W	—	+	I	I	+	—	—	+	I	—	—	—	—
19	—	—	—		+	+	+	+	W	I	+	I	I	I	—	—
20	—	—	—	—	+	I	I	+	I	W	+	I	I	I	—	—

*Ducks were exposed to contaminated water for 30 days. Calf exposure to these ducks began eight days later. **dilution of sera. ***negative a.l. test. §positive a.l. test. §§incomplete a.l. test. §§§weak positive a.l. test.

Results and Discussion

The data in table 1 show serologic evidence of infection in three of the ducks on the 20th day after the Leptospira contaminated urine was placed in the drinking water. Two weeks later a total of 12 ducks showed evidence of a serologic reaction. The reaction was strong in only seven. After 140 days three of these seven sera still exhibited complete agglutination at the 10^{-1} dilution.

TABLE 2. Serologic Reactions of Calves Exposed to Seropositive Ducks

Calf No.	Days Following Exposure 0	45 through 150††
176†	(—)	(—)
191†	(—)	(—)
194†	(—)	(—)
196†	(—)	(—)

†All these calves became seropositive when challenged later with *L. pomona* culture.
††Ducks were removed from the calf pen on the 102nd day of contact with calves.

As table 2 shows, there was no serologic evidence of leptospirosis in the calves exposed to the seropositive ducks.

Additional exposure would have been obtained by allowing the calves to stand in the water trough which also served as the drinking water source. Ringen and Bracken[6] have reported experimental leptospirosis in calves exposed by placing the feet in contaminated water.

Most of the laboratory animals inoculated with water from the duck and calf exposure pen died of acute peritonitis. Although no conclusive serologic evidence of leptospiral infection was observed in sera from the survivors, one hamster exhibited a weak agglutination reaction in the 1:10 serum dilution.

Summary

Calves exposed to water subject to contamination by domestic ducks infected with *L. pomana* failed to show evidence of leptospirosis.

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Air Ship Baby Chicks to India

The Agricultural Co. of Pan America, Guilford, Conn. succeeded in filling a contract to ship 30,000 baby chicks by air to New Delhi, India.

The fact that baby chicks are sustained without food or water for 72 hours after hatching made possible this shipment of chicks the longest ever attempted. Bringing off timed hatches, sex separating, and coordinating prompt delivery to plane was an enormous task. Weather factors might have intervened at any point from start to finish and delays would have caused possible complete loss.

A regular passenger C-54 was engaged, which with seats removed allowed for 300 units of 100-chick pullmans to be spaced for proper ventilation. Flight time was 55 hours, stops being made in Newfoundland, London, Marsailles, Cyprus, Bahrein, Arabia, and finally New Delhi.

Losses were reported to be negligible.—*The Shore Line Times*, 2/21/57. (abs. *Poultry Digest*, Apr. 57).

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Liver Condemnations

California meat inspection report covering slaughter operations in the state during 1956, reveals that 52,449 beef livers were condemned because of abscesses and 82,625 for fluke infestation. These figures are considerably above those reported for 1955.

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An outbreak of scrapie has been confirmed in a flock of purebred sheep near Dixon in Salano County, Calif. State and federal livestock authorities have imposed a quarantine prohibiting movement of sheep from the infected area. All animals found infected or exposed will be destroyed, and all infected areas will be cleared and disinfected under the direction of veterinary inspectors.

Infection is believed to have been introduced into the flock found infected by a purebred ram imported from England about three years ago.

EDITORIAL COMMENTS

Poultry Inspection Legislation

Additional legislation has been prepared for Senate consideration dealing with the matter of compulsory poultry inspection. This is noted as Senate Bill 1747 and appears only to confuse deliberations of legislators.

The latest bill (1747) lacks essentials of desirable public health legislation, is primarily a processor's measure in that it provides protection for large processors for unrestricted movement of poultry into large consuming areas, and above all, threatens the entire structure of the food inspection service from a consumer-inspection standpoint by providing that other than federal civil service personnel may be employed as inspectors. As written, the measure would allow part-time state employees to function under authority of the USDA.

In pointing out undesirable features to members of the Association of State Public Health Veterinarians, Dr. Oscar Sussman, New Jersey State Department of Health and secretary-treasurer of that body stated that "If the federal government can delegate federal inspection duties to state agencies with respect to poultry, I can not see where, in a few years, it should not also delegate the same type of inspection duties to state agencies with respect to red meats."

As matters stand, it appears that the opinion and sincere efforts of qualified public health servants whose life's work is in effort to maintain public health are losing out to a marketing lobby at the hands of legislators who apparently fail to discern qualified opinion when it is offered. Certainly, disgraceful conditions have existed in the past, and exist now, which have been and are countenanced by the food producing industry. An example is the lack of universal acceptance of the value of garbage cooking laws and their strict enforcement.

Elements of good poultry legislation have been outlined and should be included in the Federal Poultry Inspection Act. These are as follows:

1. Required antemortem inspection.
2. Required postmortem inspection.
3. Requirements for general sanitation.
4. Restrictions against so called "New York dressed" poultry.
5. Inspection paid for and controlled by qualified government agent — Meat Inspection Branch.
6. Inspection responsibility in professional hands.
7. Restriction on movement of other than properly inspected and marked dressed poultry.

Failure of Congress to pass sensible consumer protective legislation as it relates to inspection of poultry for wholesomeness is to sacrifice the health of consumers and the structure of a vital food producing industry.

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Summary of Serological Test of Missouri Veterinarians

Blood samples were collected during session of the 32nd Annual Conference for Veterinarians held in Columbia, Mo., on Oct. 1 and 2, 1956 for serological test. The survey was sponsored by the School of Veterinary Medicine, University of Missouri in cooperation with the School of Medicine, University of Missouri and the Missouri Division of Health.

A total of 155 blood samples were collected and studied by various laboratories. Eleven were from persons residing in adjacent states while seven were wives of veterinarians. All samples were subjected to tests for brucellosis, tularemia, leptospirosis, Q fever, psittacosis, APC_5, and influenza A prime.

Only 22 had a suspicious titer (1:80 or higher) for brucellosis. However, 46 were positive in lower dilutions.

Two practitioners had titers of 1:20 or higher for tularemia.

Nine strains of leptospirosis were checked for, and nine samples revealed some reaction. However, only three had a titer considered significant (1:100). Of these three, one was positive for *L. pomona*, one for *L. canicola*, and one for *L. grippotyphosa* (the latter probably contracted in Europe).

Two of the sera showed significant titers for Q fever. Further investigation indicated that one was probably contracted in the enzootic areas of the West and the other on the Island of Corsica (another enzootic area).

Eight sera reacted to psittacosis antigen. Only five had a probable significant titer (1:8 or higher). None were higher than 1:16.

Seven sera were positive for APC_5, with six having significant titer (1:8).

Nine gave a positive reaction to influenza A prime, eight of which had a significant titer (1:8).

Comments

While it is not considered good epidemiological practice to draw conclusions on less than two specimens from an individual, it is possible to make generalized statements.

1. All blood samples were obtained from apparently healthy people, with the exception that some were recovering from, or had, severe colds, or possibly influenza.

2. Most of the titers obtained fell within the range that is commonly seen among patients who have had similar infections several months or even years before. Some of the brucellosis titers, however, were suggestive of acute cases, or at least, recent infections.—*E. R. Price, D.V.M., Public Health Veterinarian, Missouri Division of Health, Jefferson City, Mo.*

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New Director for Foot-and-Mouth Disease Center

Dr. William M. Henderson, M.R.C.V.S., D.Sc., University of Edinburgh, has been appointed director of the Pan American Foot-and-Mouth Disease Center at Sao Bento, near Rio de Janeiro, Brazil.

Formerly deputy director of the Research Institute (Animal Virus Diseases) in Pirbright, England, Doctor Henderson succeeds Dr. Ervin A. Eickhorn who resigned to return to the United States last year. Doctor Henderson is author of Qualitative Study of Foot-and-Mouth Disease. The method of virus estimation with which this deals is now known as Henderson's method and is widely used in research institutes.

The Pan American Foot-and-Mouth Disease Center was created in 1951 with Technical Cooperation funds of the Organization of American States, and is operated by the Pan American Sanitary Bureau. Its work is the training of national laboratory and field staffs responsible for the control of foot-and-mouth disease in the Americas, the provision of a field consultation and confirmatory diagnostic service and research. The Center's research facilities and activities and field services, are now being expanded to serve all the countries of the Americas.

Guy H. Williams Retires

Guy H. Williams, well-known, genial president of Corn States Laboratories, has retired from active management of the Omaha concern. It is appropriate on the occasion of this announcement to recall that Guy Williams has lived a staunch supporter of veterinarians and veterinary interests while developing and operating one of the leading veterinary supply concerns of the nation.

Guy H. Williams

Nebraska born and educated Guy Williams graduated from Peru State Normal School, Peru, Nebr. in 1906. After serving as principal of high schools at Chadron and Alliance in the western part of the state for five years, he entered the law school of the University of Nebraska graduating in 1914 with scholarship honors — Order of Coif. He entered business in Omaha immediately following graduation and served as president of the Corn State Laboratories for 35 years until transfer of the company to Eli Lilly and Company in April 30, 1956.

The economic readjustment which followed World War I brought Guy Williams into management of The Corn States Serum Company, then a young company among 70 licensed producers, struggling for a share of business in a new field created by the comparatively recent Dorset, Niles, McBryde discoveries. In that period the conflict between veterinary versus lay control of animal diseases was taking form. Mr. Williams did not hesitate to align his company squarely behind the profession, a decision which thereafter governed all company activities and policies.

The fateful and destructive hog cholera antiserum shortage in 1926 convinced Mr. Williams of the tremendous importance of effec-

tive prevention and control of all animal diseases. In that year, more than a $1,000,000. worth of hogs were estimated to have died from cholera due to inability to procure adequate quantities of antiserum and virus. Indiscriminate use of virus and faulty lay diagnosis undoubtedly contributed greatly to spread the contagion.

Following this disastrous experience, The Corn States Serum Company began a vigorous expansion program which ultimately developed two highly efficient plants both near Omaha. It is among Mr. Williams' greatest satisfactions that subsequent to 1926 no customer order for hog cholera antiserum and virus went unfilled and during World War II, in the year 1943 when hog production reached an all-time peak, the company supplied 250,000,000 cc. of H. C. serum to its customers.

Beginning in 1940, the company expanded its field of production to include most of the generally recognized and needed biological products for animal use. It acquired a combined office and laboratory building in Omaha and an experimental and research farm near the city. Some of the now accepted means of controlling several animal diseases are the result of these progressive steps.

Throughout the years of company development, Mr. Williams was extremely active in the affairs of the entire biological production field. He was the first president of Associated Serum Producers, an organization which has greatly contributed to the progress and prestige of the veterinary profession through forceful and consistent publicity of its achievements. In the depression years following 1929, he served on industry committees which formulated the N.R.A. Code. Upon its demise through Supreme Court decision, Mr. Williams succeeded in obtaining Congressional approval of an act known as the Marketing Agreement for Handlers of Anti-Hog Cholera Serum and Virus, which had the effect of stabilizing production and marketing processes in the public interest. Mr. Williams was the first chairman of the Control Agency, an industry group which administers the Act. The effectiveness and usefulness of this Act was amply demonstrated during World War II when the entire industry was called upon to furnish inordinate amounts of serum and virus to protect food supplies as a war emergency necessity.

A critical challenge to veterinary interests arose in 1942 when a federal court in Chicago indicted Associated Serum Producers, Inc., and 13 member companies and several officers of each firm. The Association, the companies, and individuals were charged with violation of the anti-trust acts in that they were alleged to have conspired to limit sales to veterinarians in restraint of trade. These indictments were brought out during the war-time when producers were struggling with the many war-time restrictions such as price control, manpower and material controls, wages and hours control, and principally with the burden of supplying huge amounts of product to safeguard food supplies.

Notwithstanding all such involvements the producers and individuals staunchly defended their right under the law to choose their customers and to maintain an association, and thus sustain the prestige and privilege of the profession in its choice of products for professional use.

In all the preliminary court procedures in this case and in the final trial Mr. Williams was extremely active, with a persistent determination that neither the Association, the companies nor individuals should bear the odium of the charges without full and complete trial. Not only the reputation of those indicted was at stake but more importantly the right and privilege of the veterinary profession to be served by an industry which set itself apart for that purpose. After several days' trial in 1945, a jury verdict fully exonerated the defendants, with only 20 minutes' deliberation.

In effecting the sale of Corn States Laboratories to Eli Lilly and Company in 1956, Mr. Williams brought into the veterinary supply field a company with a long and proud history of accomplishment and cooperation with human medicine. The history of the next 25 years will probably witness comparable developments in veterinary medicine.

Mr. Joseph E. Marmon has been elected president by the Company Board of Directors to succeed Mr. Williams.

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In 89% of dairy herds that come under the New York State Mastitis Program (over 11,000,000) for the first time this year, some one or more lactating animals secreted other than normal milk. Such an observation emphasizes the enormous importance of the disease among dairy cattle.

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Although not fatal, foot-rot in cattle is the third most common ailment of dairy cattle and is responsible for serious losses. — *Francis A. Simpson, D.V.M.*

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.

Manhattan, Kansas

Cautious Use of Spray Chemicals

Parathion poisoning in human beings is reported with increasing frequency in current literature. This insecticide is quite generally used in agriculture for the control of aphids and mites on trees and other forms of vegetation. Its extremely poisonous nature precludes its use in households or public places. However, human beings are exposed during its use as a spray on vegetation. It is absorbed through the skin, conjunctiva, and from the respiratory and digestive tracts. In the human system it is a potent inhibitor of cholinesterase, and in addition to other symptoms of intoxication, miosis is observed in most cases. Atropine sulfate in small repeated doses is therefore a part of the treatment by physicians. The commercial product is usually diluted with an inert substance so that it contains 5% or less of the active ingredient. Since the spray season is approaching, veterinarians can be helpful in cautioning their farmer friends to protect themselves by wearing masks and gloves during the use of parathion.

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Vesicular Stomatitis Reportable

Vesicular stomatitis seemingly is enzootically present in many sections of the United States. It is one of the trinity of vesicular ailments — foot-and-mouth disease, and vesicular exanthema are the other two — that has existed since ancient times. Clinically it is most frequently recognized in swine, cattle, and horses though man, and some wild animals may also contract the condition. The etiological virus enters through abrasions on the tongue, snout, or muzzle, and also through the ingestion of contaminated material. When not in contact with living cells the virus can not persist for more than a comparatively short period, a few days at the most, though the fact that some wild animals are hosts explains the appearance of the disease in herds where no domesticated animals have been for some time previously. It has also been hinted that tabanids and mosquitoes may be vectors.

After gaining admission to the tongue or snouts epithelium of cattle and swine the virus quickly penetrates deeper so that it reaches the blood stream, also the saliva in 24 to 48 hours, and then in a few hours clinical symptoms appear such as drooling, vesicles, hyperthermia, and general malaise. Foot vesicles are frequent. The virus disappears from the blood stream early in the course of the disease, and repair of the damaged tissues sets in so that in two or three days affected animals are again walking and taking food, and in about two weeks there is a complete return to normal. In these recovered animals high titer neutralizing and complement-fixing antibodies are readily demonstrated. The economic loss to livestock owners is considerable. There is always the possibility, especially during the early stages of an outbreak, that the anomaly may be confused with the far more serious foot-and-mouth disease, and therefor a repetition of the injunction to report all outbreaks to state and federal sanitarians for tests so that prompt control meausres may be instituted if necessary without delay.

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Urea not Practical for Swine

Three experiments conducted at the Iowa Agricultural Experiment Station concerned the value of urea in the ration of growing swine. These indicated "that urea has no place in practical swine rations." In some of the combinations in which different percentage levels of urea were used, there were slightly improved gains but feed required per pound of gain also increased.

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In *U. S. Public Health Service Reports* for Jan. 1, 1957, a survey of rabies in bats as observed in western Montana is reported in which is contained the following rather significant notation: "It is noteworthy that none of the 121 bats collected while roosting were infected whereas three of six bats that exhibited abnormal behavior had rabies." The titers of virus of the three inoculated into mice was rather low and remained so after several passages.

THE PRACTITIONER'S LABORATORY

WILLIAM L. SIPPEL, B.S., V.M.D., M.S., Ph.D.

Kissimmee, Florida

Preparing Specimens for Shipment

The practitioner expends considerable time and effort in collecting and mailing tissue specimens to a laboratory for diagnosis. Time is money to a practitioner, and as there is a direct correlation between the quality of specimen received at a laboratory and the results that are obtainable, it is a sound business practice to prepare specimens properly. Considerable care should be exercised in selecting the right specimen and its preparation for shipment.

Fig. 1. Previously chilled tissue specimens are packed in individual plastic freezer bags which are then packed around the frozen ice filled balloon. Adequate insulation will prevent too rapid warming and assure safe arrival.

Specimens for Culture

Organs to be cultured should be taken shortly after death. If postmortem degeneration has advanced, cultures will probably be so overgrown with organisms that have invaded from the intestinal tract thereby rendering the results valueless.

Ordinarily heart blood, spleen, liver, lung, and kidney are selected for routine culturing. Other specimens might be selected under certain circumstances. For example, if listeriosis or blackleg were suspected, the brain and medulla or affected muscle tissue would be submitted. To prevent contamination, organs for culture should be removed before the digestive tract is opened. Each organ or a one-pound section is placed in an individual, water tight plastic bag. Freezer locker bags serve well and can be twisted shut and held by a rubber band.

Bags are then placed in some type of refrigerating material and shipped by the fastest practical route. The following refrigerants work well:

1. A wide mouthed gallon thermos jug filled with cracked ice. These are inexpensive and can be returned for repeated use. In our experience this has been the best technic for specimens requiring 24 to 36 hours to reach destination.

2. A toy balloon (fig. 1) filled with water is placed on a piece of dry wax paper in the freezing compartment of refrigerator or deep freeze to freeze solid. When the balloon is frozen, previously cooled specimens are packed around it with plenty of insulation. This works well if a large enough balloon is used and will provide refrigeration for 12 to 18 hours. Frozen cans of water used in the shipment of biologicals are too small in relation to the size of the specimens to provide adequate refrigeration.

3. Dry ice and insulating material (fig. 2) refrigerate almost too well, as the specimens are usually received frozen solid. Before they can be cultured they must be allowed to thaw. However, dry ice is quite satisfactory for specimens for virus recovery; (50% buffered pH 7.4 glycerol also works well as a preservative for most viruses).

An alternative method obviating the use of refrigerants has recently become possible with the availability of commercially prepared culture plates. Blood agar and eight other types of media are available.* After streaking with a sterile swab or loop, the plate can be resealed in its plastic bag and forwarded to the laboratory for incubation and identification. This procedure makes a good impression on the client and eliminates the necessity for refrigeration in shipment. Those who prefer may do their own incubation and identification.

*Hyland Laboratories, 4501 Colorado Blvd., Los Angeles 39, Calif.

Fig. 2. Bovine fetus shipped in sealed plastic freezer bag packed in metal container. Dry ice serves as refrigerant. Cotton seed hulls used in this case as insulation and packing material.

Histopathological Examinations

For histopathological examinations, tissues taken shortly after death should be placed in a quantity of 10% formalin, (formalin is a 40% solution of formaldehyde gas), equivalent to ten times the volume of the specimens. If whole or half brains are fixed, they should be put in formaldehyde and kept in the refrigerator overnight before mailing. Of course these specimens can not be cultured.

Mycology

Hair and deep skin scrapings taken from the edge of a lesion can be sealed in an envelope or sterile, stoppered test tube and mailed without a preservative or refrigerant.

Fecal Specimens

Parasitological examinations (egg counts) can be made on feces placed in tight stoppered jars and preserved with ice packed around the jars, or more conveniently, by adding 10% formalin to the specimen. While the formalin method preserves the specimen well, it shrinks the eggs and makes identification more difficult.

Selection and preparation of specimens for toxicological diagnosis is important and will be discussed in a future issue.

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Some experimental work conducted at Kansas State College, Manhattan, suggests that the favorable effect of low level antibiotic feeding is in the influence of the antibiotic on the physiology of bacteria making these microorganisms more susceptible to body defense mechanisms.

Abscess in Bovine Heart: Case Report

PETER GAILIUNAS,* V. S., Grand Rapids, Michigan

Although suppurative myocarditis and abscess formation in the heart are described in the textbooks, it appears that first-hand reports on their occurrence are rare. From approximately 60,000 cattle and calves inspected, only one abscess in bovine heart has been observed by this writer. It is described in this report.

During routine meat inspection recently, an abscess was revealed in the right ventricle of an 18-month-old Hereford steer. It occupied the space between ventricular and septal walls in the apex, closely attached to the trabeculae carneae; however, it was not grown into the myocardium. Outwardly, the abscess appeared as a spherical, fat-resembling mass 3 cm. in diameter. The transverse section through the mass revealed a well encapsulated abscess. The outer wall was calcified harboring inside, pale-yellow liquid pus. The heart was normal otherwise. The animal was in good flesh and no other gross pathological changes were detected elsewhere in the carcass, except slight adhesion between liver and diaphragmatic peritoneum. It appears that the abscess was a remnant of the suppurative, hematogenic myocarditis possibly from early calfhood.

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Avian Diseases

A new quarterly publication to be named *Avian Diseases* has been announced by the New York State College of Veterinary Medicine. Dr. P. P. Levine, Professor of Poultry Diseases at Cornell has been designated as editor. The publication will be sponsored by the *Cornell Veterinarian* and will be designed according to information release, "to fill a real need for those engaged in the field of poultry diseases."

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Air conditioning and heating to guarantee temperatures between 50 and 70 degrees the year around would make possible putting hogs on the market 100 days after weaning on 600 lb. of feed or less, according to some authorities.

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*The author is associated with the Municipal Health Department, Grand Rapids, Mich., as veterinary inspector. He graduated from the Veterinary Academy, Kaunas, Lithuania in 1943, and after one year on staff duty at that school was engaged in general practice and meat inspection in Bavaria, Germany. He has been employed in his present position since 1953.

POULTRY PRACTICE PROBLEMS

W. R. HINSHAW, D.V.M., Ph.D.

Frederick, Maryland

Food Handling Technics

Agricultural Marketing Service (AMS), Agriculture Handbook 105, Protecting Perishable Foods During Transportation by Truck gives detailed instructions for handling meats, fruits, melons, vegetables, poultry, and dairy products. Some of the items covered are refrigeration; preparation and loading, including cleaning and sanitation requirements; and details for handling a large number of individual products. Examples are shell eggs, fresh dressed and chilled poultry, for which recommended temperature and humidities are given. Illustrations for example show recommended methods for storing egg cartons for best refrigeration and air circulation. For the veterinarians interested in food inspection and public health this handbook is recommended.

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Losses from Disease

According to a recent release from USDA, U. S. poultrymen suffered an annual loss of $248,672,000. for the years 1942-51 due to disease. This figure is based on data collected by the Crop Reporting Board and covers estimated loss in eggs, chicken and turkey production as a result of attacks of infectious diseases. A few specific yearly losses include, Newcastle disease $24,012,000.; infectious bronchitis $7,055,000.; infectious laryngotracheitis $14,848,000.; and, fowl pox $1,425,000.

Farmers Bulletin 2030, Marketing Farm Poultry is a newly revised edition of Farmers Bulletin 1377. Its 68 pages include a complete discussion of sources of farm poultry for market, consideration in planning a marketing program, methods of preparation of poultry from selection, finishing and crating of live poultry to the complete processing technics. Other points covered include grading and inspection, packaging, freezing and storing of processed birds, and selling technics. It is well illustrated and should be a valuable reference.

Disposing of Poultry Wastes

Agricultural Engineers W. A. Bailey and W. A. Junnila in cooperation with W. A. Aho, and W. C. Wheeler of the Connecticut Agricultural Experiment Station and H. C. Wheldon of the Maine station have developed a method of disposal of dead chickens on large poultry farms and waste from poultry processing plants. The method consists of digesting the carcasses and/or waste products in a heated septic tank.

Preliminary studies reported by them (*Agricultural Research* 5 (9):14, Mar. 1957) indicate that a 500-gallon tank, or two smaller ones, will meet the needs of a 10,000 hen or 20,000 broiler farm. Within a two-week test period a tank warmed to 100 F. disposed of all but the bones of carcasses. It took only two to three kilowatt hours of current per day to maintain this temperature in a 500-gallon tank. The system depends on mesophilic bacteria which multiply best at 90 to 100 F. Neutralizing the mass at intervals with lime and adding hot water accelerated the action and speed of decomposition. Greater details and illustrations will be found in the report.

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Water treatment of cereal grains, such as barley, which procedure consists of soaking, then drying, appears to so improve the feeding value that when compared with corn, poultry responded equally well. Up to this point, feeding guides have listed barley as having about 70% the feeding value of corn for chicks and about 80% for laying hens.

Studies on feed efficiency at the Pullman, Wash. station are revealing significant new facts of interest both to feeders and veterinarians.

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Georgia State Department of Agriculture recently dedicated its third Poultry Disease Diagnostic Laboratory at Cedartown, Georgia. Dr. Lawrence Mitchell has been named director of the laboratory.

BOOK REVIEWS

Books reviewed in this department and any other books, if available, may be obtained by remitting the published price to the Book Department, Veterinary Medicine, Suite 803 Livestock Exchange Building, Kansas City 2, Missouri.

THE EVOLUTION OF THE VETERINARY ART, by J. F. Smithcors, D.V.M., Ph.D., 424 pages, 42 plates. Veterinary Medicine Publishing Co., Inc., 803 Livestock Exch. Bldg., Kansas City, Mo., publishers, 1957. Price—$6.50.

No profession has had a more dramatic or tormented history than veterinary medicine, and the writing of no history has remained more of a neglected epic. A recent quickening of the spirit of inquiry into the history of the veterinary art was signaled by the publication of a series of articles on The History of Some Current Problems in Animal Disease (*Vet. Med.* 51:89 [Feb.], 1956; 51:249 [June], 1956; 51:457 [Oct.], 1956; 52:127 [Mar.], 1957) that followed a discussion on the origin of the term "veterinarian" in the now memorable Anniversary Issue of VETERINARY MEDICINE (50:525 [Nov.], 1955). This interest also reflects the profession's increased stature in the modern world. Unfortunately students who have attempted to study the history of their profession have discovered only a building yard in utter confusion. Until recently no scholar has had the patience, the honest scholarship, in short, the vision and audacity to write a history of the profession solid in conception and scarcely dated in detail. Now Dr. J. F. Smithcors has filled the void of that neglected epic.

The Evolution of the Veterinary Art embodies a study of some aspects of the veterinary profession's long and varied history. Both the author's title and text carry a subtle distinction. The story of the veterinary art begins in antiquity and continues today. The Evolution of the Veterinary Art carries that same story to the brink of the development of veterinary science, but does not encroach upon that different story.

Veterinary medicine took form in humble beginnings, perhaps in the camps of nomads and more domestic tribes, whose superstitions and practices still haunt the art today. It reached a relatively high plateau in ancient India, and fell as civilization itself fell under the iron fist of barbaric invaders. If seeds of enlightenment appeared, they seemed destined to be dropped upon a glacier—to be embalmed and sterilized in a river of ice for centuries to come.

It has sometimes been stated that all history is contemporary history, and that there can be no other type. Each generation must examine anew the accretions of the years, and each generation sees in a different perspective the scenes in history that other historians have viewed differently from their own point of view in the time-space dimension. And yet the gifted scholar can enter intimately into the life and times of an historical period without at the same time losing his essential independence of the contingencies of history. Doctor Smithcors is such a scholar. He has carefully evaluated medical practices in the light of what the state of the arts defined at a particular time, and not in terms of later findings.

The Smithcorian technic for telling the veterinary story is unique. Weaving tremendous erudition and related understanding into his chapters, The Evolution of the Veterinary Art emerges something like a motion picture film. There are two ways of looking at this type of history: (1) By immobilizing it and scrutinizing each frame separately, and (2) by screening it with attention to its continuity. Doctor Smithcors does both. When he immobilizes it, history becomes a series of microscopic incidents revealing a wealth of interesting detail. When he screens it he draws out the continuity of the veterinary art in its march through the centuries with both scope and power.

The Evolution of the Veterinary Art is much more than musty woolgathering about the past. The main message of the book belongs to veterinary medicine, but in the heart of a very readable text the author has outlined the lessons of history. His volatile style and the bitter sting with which he sometimes writes makes him a cynical and satirical giant of dissent to many of the ages upon which he reports. Future generations of veterinarians owe Smithcors to the stimulation of thought, event to the controversies he arouses, a very great debt.

The absorbing accounts of veterinary practice in biblical times, under Roman civiliza-

tion — with Cato's cabbage cures, Virgil's descriptive verse, and Vegetius' Books of the Veterinary Art — even the ancient recognition that "On mules and dogs the infection first began, And last, the vengeful arrows fixed on man," succintly demonstrate that very little time is needed to annihilate manifestations of human progress, and that progress itself is the result of the aptitude of a few and of momentary conditions in history.

Throughout his work Smithcors argues that a high development of veterinary medicine in all ages was dependent on a fundamental awareness of kinship between animal and man. By kinship the author does not necessarily mean a belief in reincarnation, sacred animals, or even animal worship, but rather a degree of civilization in which men have empathy with pain, suffering, and the miracle of life.

The Europe that emerged from seven dark centuries provided the scene of the veterinary art's greatest gloom. With internecine strife disrupting the whole of the continent, with the continent itself sealed in by Islam, and the Roman empire reduced to the Byzantine remanent of the Mediterranean culture area, western Europe fell to the barbarians. Brought too suddenly into contact with civilization, the barbarians, in their haste to enjoy its advantages, adopted its vices, and the Romans, no longer restrained by the strong hand of the state, acquired the brutality of the barbarians. There was a general unleasing of the crudest passions and basest appetites with their inevitable accompaniment of perfidy and cruelty. The Church itself underwent a substantial transmutation from the proletarian cult of early Rome to the feudal hierarchy of the papacy. Europe remained a frontier in which ancient culture was only partially installed. The results in veterinary medicine were terrifying. The progress of the art was not only arrested, but driven back at least 1,000 years.

The accidents of plagues and the tragedy of barbarism invading the very gates of Rome had consequences in veterinary medicine that only Smithcors has properly evaluated. From sixth century Europe to 1800, wars and disease never allowed the continent's population to become greater than 180,000,000. From 1800 to 1914 the population jumped to 460,000,000. It can hardly seem strange that the flower of veterinary accomplishment was so long delayed.

The blood stick, the cow-leech, the fearless farrier, the demonology, the filthy concoctions that came to signify veterinary medicine were all an outgrowth of a frontier in which ancient culture vied with barbarism for dominance. The worst features of Roman and Greek veterinary medicine seemed to struggle against the equally revolting and useless practices held over from barbaric habit and practice. Civilization itself became barbaric to a degree. Patron saints for animals, ecclesiastical intervention to silence the rare voices of enlightenment were also the natural historical outgrowth of this period, an unfortunate circumstance for veterinary medicine.

Veterinary literature—good, bad, and indifferent—proliferated most of Europe the three centuries after the Middle Ages covered by this history. Its contents were disgorged like a gigantic volcano—an occasional flash of light, but for the most part the thunder and smoke of the old order.

But history in the long run draws its nourishment from the valleys, not the heights, and the diffusion of knowledge to the general level through the ages by the establishment of veterinary schools has remained a necessary task. How the farrier, the ignorant horse doctor, the self-styled veterinary practitioner was eventually replaced fills the chapters of this book with a story so strange that it borders on the unbelievable.

Pre-Publication Order Form

The Evolution of the Veterinary Art

by J. F. Smithcors, D.V.M., Ph.D.

(Tentative publication date May 25, 1957.)

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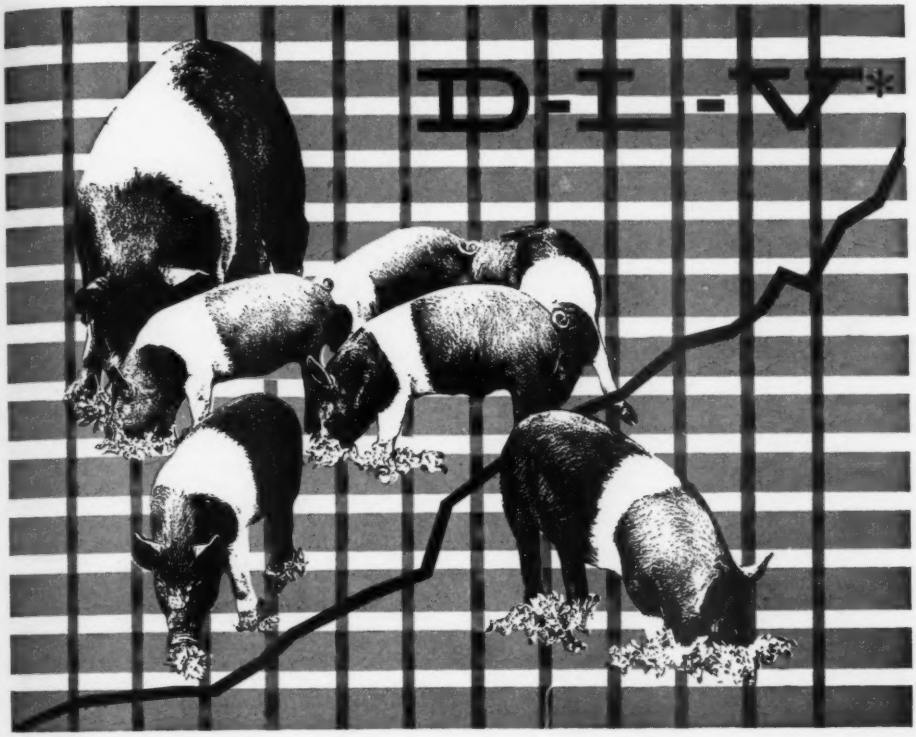

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To assure inclusion, copy must be supplied by the 5th of the month preceding date of issue (January 5 for February issue: February 5 for March issue, etc.).

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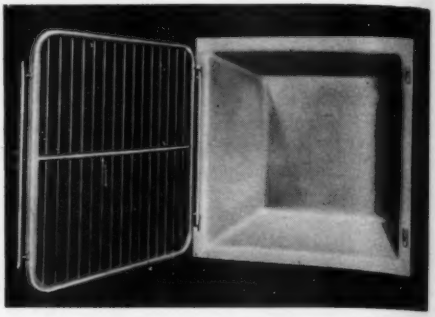

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Young chickens (excluding commercial broilers) raised on farms in 1955 totaled 461,868,000, 14 percent less than in 1954. There were 1,078,264,000 broilers raised, 3 percent more than in 1954.—*W. R. Hinshaw, D.V.M.*

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Course in Diagnostic Methods in Veterinary Mycology

During the week of Feb. 25-Mar. 1, 1957, the Communicable Disease Center of the U. S. Public Health Service presented at Chamblee, Ga. a course in laboratory diagnostic methods in veterinary mycology. This course was designed to familiarize veterinarians, laboratory directors, and others concerned with procedures for detecting, isolating, and identifying the fungi which produce mycotic infections in lower animals. The etiologic agents were studied in tissue and in culture. Methods of diagnosis covering specimen collecting, culture media, laboratory animal inoculations, biochemical, and other procedures were taught, used, and demonstrated. The symptomatology, epidemiology and public health implications of the animal mycoses were also stressed.

Application for next year's course in veterinary mycology will begin in July 1957 and is tentatively scheduled for the month of February, 1958.

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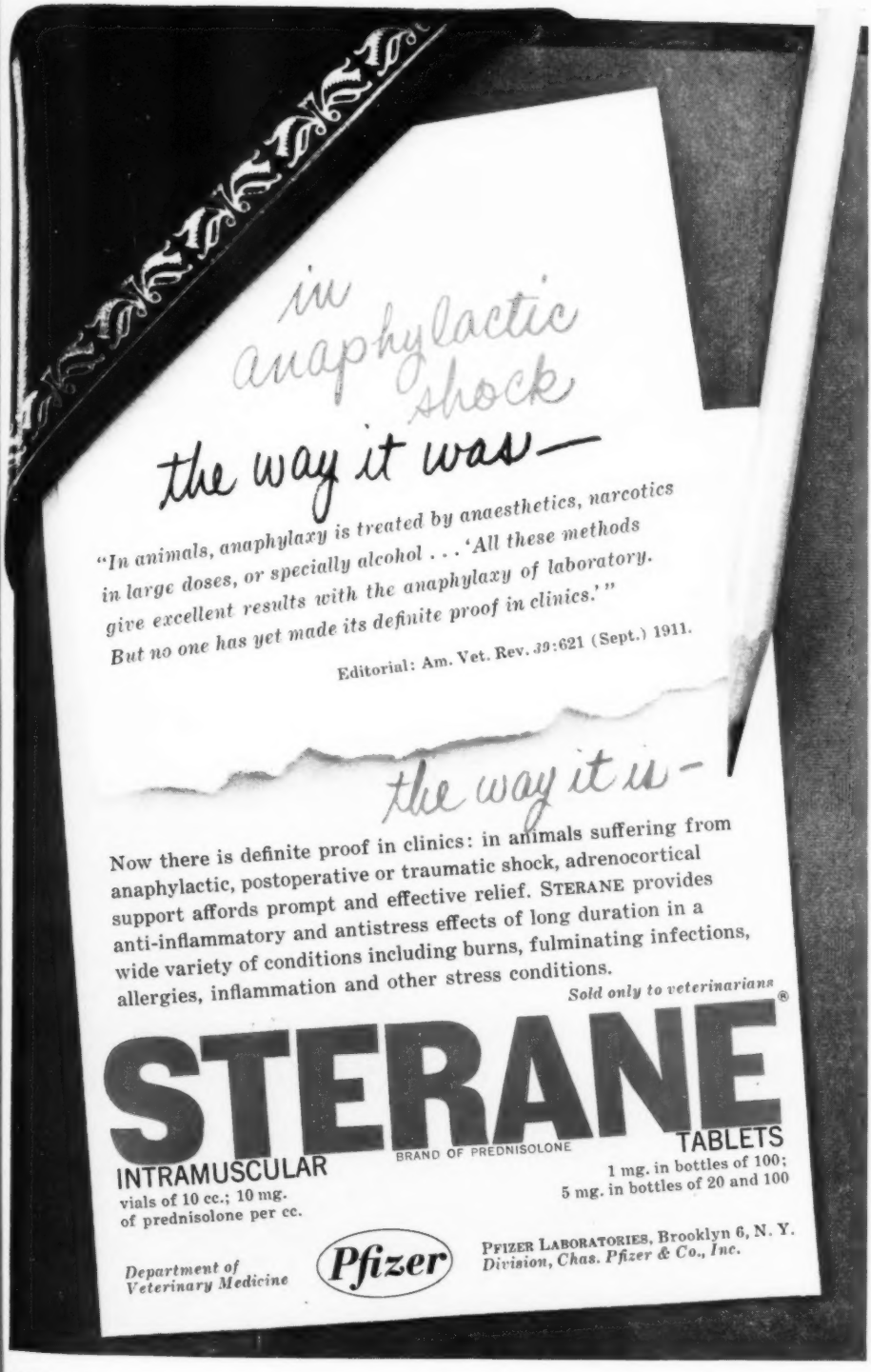
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Research Reveals Highly Effective Anthelmintic for Cattle

The results of recently intensive clinical research revealed an anthelmintic that is highly effective in cattle. Individual animals were confined in special stalls and administered different phenothiazine drench formulations for testing. All urinary and fecal excreta were recovered and each excretion was individually analyzed chemically to determine how much of the dose went into the digestive tract and amount of the dose available for killing worms. Dosages were given on an identical basis.

GREATER CONCENTRATION

Results obtained from this modified formulation were better than that of unmodified drenches generally used. Tests show that modified formulations produced on the average 6 to 8 times more phenothiazine in the digestive tract in a shorter period of time than other drenches. For example, peak percentages (above 1%) of the modified chemical were obtained in only 17 hours post treatment while the average of unmodified formulations returned a peak percentage of less than .2% 40 hours or later post treatment.

All statements regarding the effectiveness of the above tests are backed by documented experimental data.

Many veterinarians are using this modified formula under the professional label Pro-Brand Improved Cattle Wormer which is sold only to veterinarians. A brochure is available on request. For details write to Pro-Brand Products Company, P. O. Box 4186, Fort Worth, Texas.

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Piperazine salts are not effective in the removal of *Haemonchus contortus* or *Trichostrongylus colubriformis* of sheep even when injected into the abdomasum. — *Hugh McL. Gordon, B.V.Sc., Aust. Vet. Jour., Jan. '57.*

Doctor Batchelor Victim of Hodgkins Disease

Dr. Robert F. Batchelor, OSV '47, assistant veterinary medical director with the Veterinary Branch of the Food and Drug Administration, Washington, D. C., died Feb. 25, 1957 of Hodgkins disease.

A native of Ohio, Doctor Batchelor joined the federal government after closing his practice at Defiance, Ohio. His assignments in federal service included service with the United States Commission for the Eradication of Foot-and-Mouth Disease in Mexico, and the Agricultural Research Service in Washington. He was transferred to the Department of Health, Education, and Welfare, Food and Drug Administration in 1955.

▾ ▾ ▾

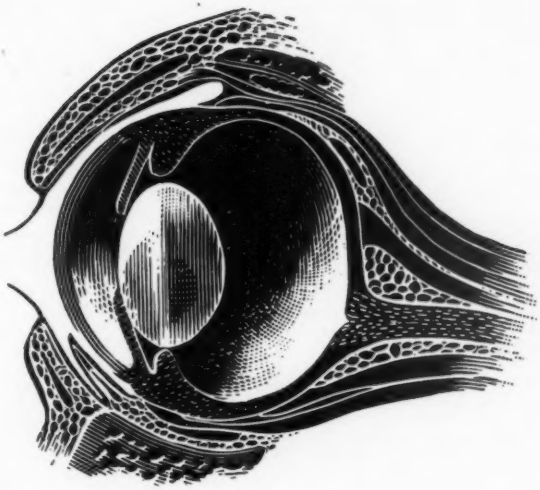
"Pigs and Progress"

Four trends characterize the hog industry today, according to *Checkerboard Service*, new publication for livestock growers published by the Ralston Purina Co., St. Louis, Mo.

These are trends toward (1) meat type hogs, (2) faster finishing, (3) proper feeding of protein supplements, and (4) improved management.

In this is explained that a meat-type hog measures about 42 in. from base of ear to root of tail and depth of body is 15 to 16 in. measured just behind the shoulder. Depth measurements should carry the entire length of body.

Monkey jockey ready for a race at Caliente Greyhound track in late fall 1936. Exhibitions such as illustrated here are used to attract crowds at new tracks.



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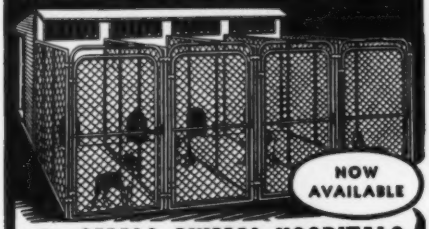

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Livestock Pest Book Available

The latest practical information on spraying, dusting, and dipping for thorough destruction of pests has been made available to livestock raisers by the California Spray-Chemical Corporation, Richmond, Calif., according to information released by that group. Entitled the Ortho Livestock Pest Book, this is a completely revised and profusely illustrated successor to previous pest books bearing the same name.

Compiled with the technical assistance of Dr. Edward G. Batte, research veterinarian, material illustrates that livestock growers save up to $9. for every $1. spent on pest control. This valuable booklet is available on request.

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University of Minnesota economist E. Fred Koller reports that there are about 30% less Minnesota farmers selling milk or cream now than in 1939. Individual herds have been getting bigger and fewer so that total milk production is actually increased slightly.

▼ ▼ ▼

Virus pig pneumonia (VPP) is the most importan tdisease of swine having worldwide distribution.—*Geo. A. Young, D.V.M.*

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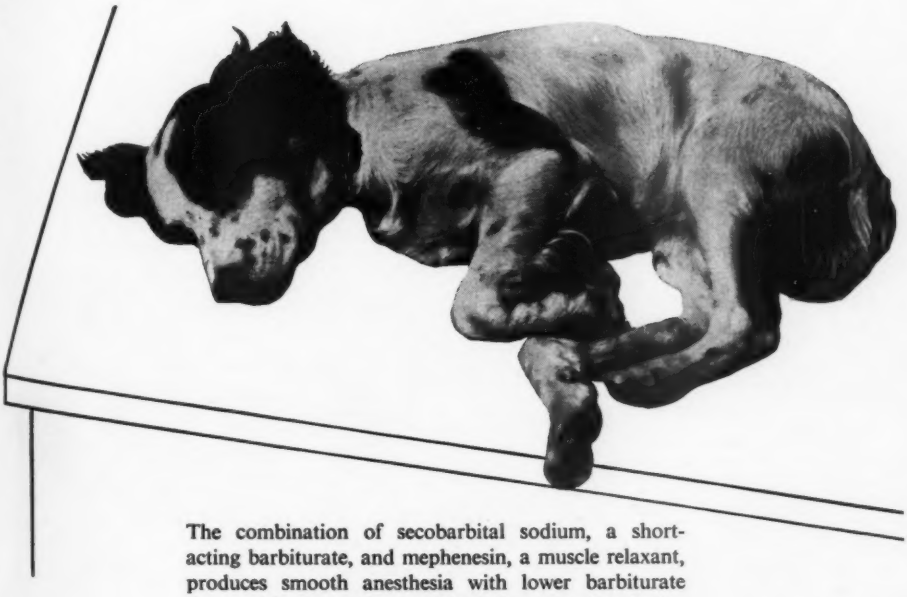

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Ten years of tests on 21 breeds of dogs at the Gaines Research Kennels indicate that dogs can be raised and maintained successfully on the dry self-feeding method. The dogs were allowed free access to dry meal-type food and fresh drinking water at all times.

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Great Dane	Welsh Corgi (Cardigan)
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BEFORE AND DURING THE TESTS,

all dogs were examined as to their weight and general physical condition. These same dogs were maintained entirely by the self-feeding method on one type of dry dog food. In another set of tests, other dogs were fed a controlled diet each day along with the continuous availability of dry food. Hundreds of individual dogs as well as several generations of various breeds were raised successfully on each of these respective diets.

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as well as self-feeding supplemented by a controlled diet, the dogs were maintained in a condition superior to that afforded by a good typical kennel diet. The dry self-feeding method proved especially successful in the case of bitches with large litters. The bitches were able to supply adequate amounts of milk for the puppies and, at the same time, keep themselves in excellent condition. By the sixth week—or normal weaning age—the puppies were already eating sizable quantities of dry food, and the "poor doers" responded rapidly when put on a self-feeding schedule.

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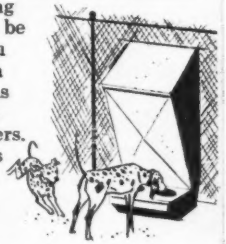
The dry self-feeding tests are continuing at the Gaines Research Kennels, opening up a new phase in dog feeding methods. If you are interested in knowing more about the self-feeding method, Gaines will be pleased to send you without obligation a report on the tests as well as information about types of feeders. Just write to Gaines Research Kennels, Box 164, Dept. A, Kankakee, Ill.



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Dr. E. P. Johnson Dies

Dr. E. P. Johnson, animal pathologist, Virginia Polytechnic Institute, Blacksburg, and discoverer in 1948 of a vaccine for Newcastle disease, died Mar. 21, 1951 at the hospital in Roanoke, Va. He had been ill for some months suffering a malignancy that took his life.

A native of Michigan, Doctor Johnson had been associated with VPI since 1930. He received his D.V.M. and M.S. degrees from Michigan State University and a Ph.D. degree from the University of Virginia. He served as president of the Virginia Veterinary Medical Association in 1947.

▾ ▾ ▾

Chicks permit an accurate measure of potency of poliomyelitis vaccine, according to Dr. Eugene A. Timm, virologist on the staff of Parke, Davis & Company, Detroit, Mich.

At present, poliomyelitis vaccine is tested for potency by vaccinating selected monkeys as recommended for prophylaxis of both children and young adults. Antibody production is then measured by serological methods employing 12 test animals for potency test of each lot.

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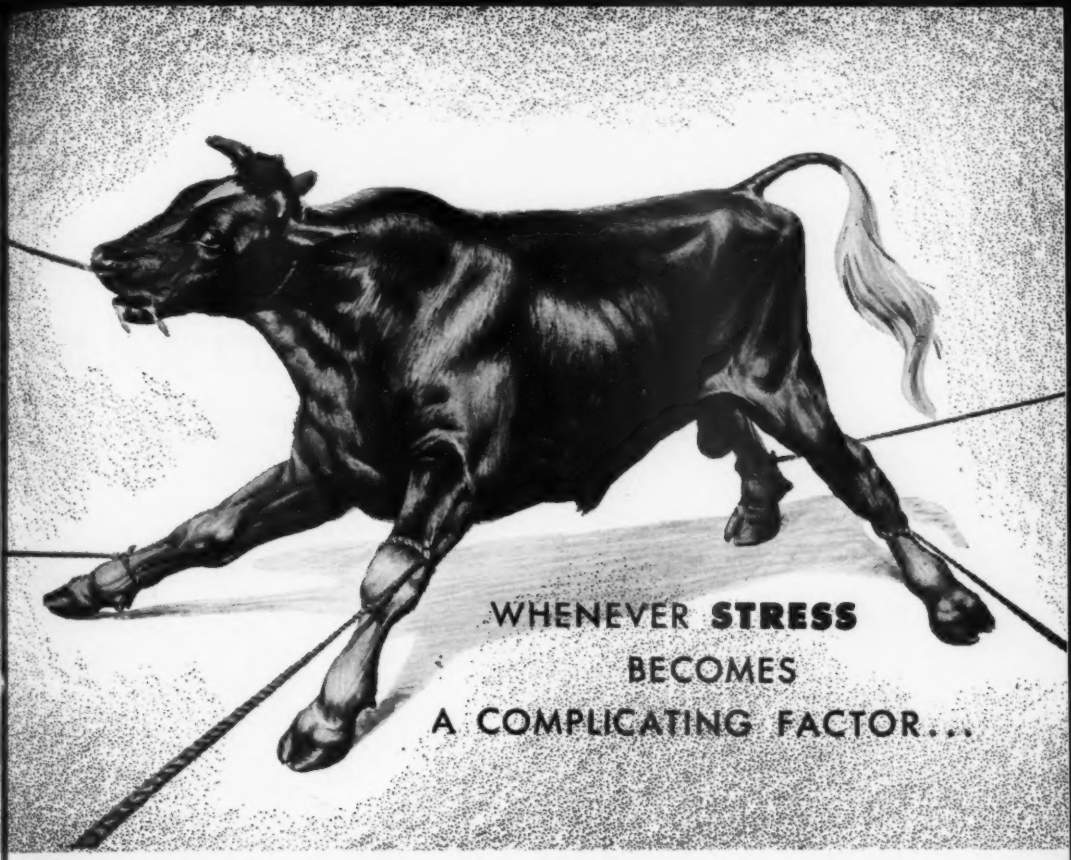

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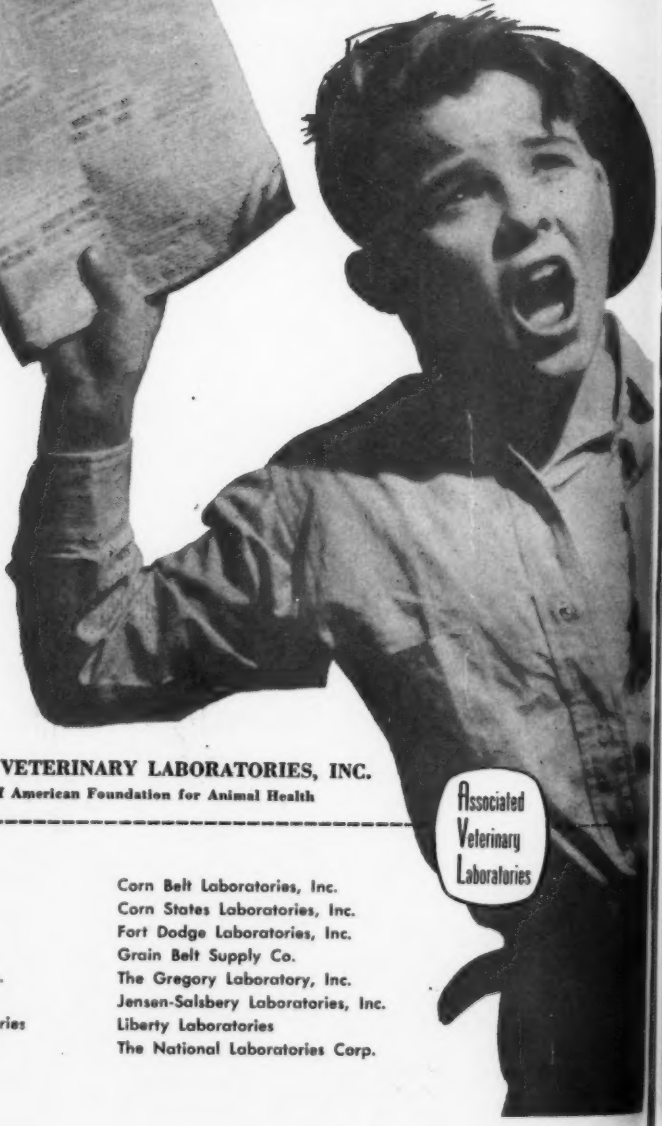

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The ethical companies listed on the opposite page make possible this nation-wide effort. Your support, in remembering them when you place your orders, will be sincerely appreciated.

Veterinarians Help To Curb Erysipelas

Farmers were urged today to be especially alert for signs of erysipelas in young pigs.

Early symptoms include high temperature, loss of appetite, stiff gait, lameness, and arched back, according to the American Foundation of Animal Health. The Foundation stresses the importance of obtaining a veterinary diagnosis at the first sign of such symptoms, so un-

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MEETING CALENDAR

Kansas State College. Nineteenth Annual Conference for Veterinarians. School of Veterinary Medicine, Manhattan, Kans., May 26-28, 1957. E. E. Leasure, dean.

School of Veterinary Medicine, Texas A. & M. College. Tenth Annual Texas Conference for Veterinarians. College Station, Texas, June 6-7, 1957. R. D. Turk, conference chairman.

Vermont Veterinary Medical Association. Summer Conference. The Lodge at Smugglers Notch, Stowe, Vt., June 18-19, 1957. Dr. A. E. Janawicz, Department of Agriculture, Montpelier, secretary.

Georgia Veterinary Medical Association. Fifty-first Annual Meeting. Georgia Continuing Educational Center, Athens, Ga., June 23-25, 1957. Dr. Chas. C. Rife, secretary.

North Carolina State Veterinary Examining Board. General Meeting. Grove Park Inn, Asheville, N. C., June 24-26, 1957. Dr. James I. Cornwell, 65 Beverly Road, Asheville, N. C., secretary.

Maritime Veterinary Associations Joint Conference. Mount Allison University, Sackville, New Brunswick, June 25-27. Dr. J. F. Frank, Sackville, chairman, Joint Committee.

Michigan State Veterinary Medical Association. Annual Meeting. Leland Hotel, Detroit, Mich., June 26-27, 1957. Dr. Paul V. Howard, 4011 Hunsberger N. E., Grand Rapids 5, Mich.

Maryland State Veterinary Medical Association. Summer Meeting. George Washington Hotel, Ocean City, Md., June 27-28. John D. Gadd, Cockeysville, Md., secretary-treasurer.

Kentucky Veterinary Medical Association. Forty-sixth Annual Meeting. The Brown Hotel, Louisville, Ky., July 15-16, 1957. Dr. Robert H. Singer, 136 Shawnee Place, Lexington, Ky., secretary.

Iowa State College. Annual Conference for Veterinarians. Memorial Union, Iowa State College campus, July 16-17, 1957. M. S. Hofstad, program chairman.

California State Veterinary Medical Association. Sixty-ninth Annual Convention. Hotel Miramar, Santa Barbara, June 17-19, 1957. Charles S. Travers, 3004 16th St., San Francisco, executive secretary.

Alabama Polytechnic Institute. Fiftieth Annual Conference for Veterinarians. Auburn, Ala., July 21-24, 1957. Dr. R. S. Sugg, dean.

Canadian Veterinary Medical Association. Ninth Annual Meeting. Hotel Georgia, Vancouver, B.C., July 22-24, 1957. Dr. J. Archibald, Ontario Veterinary College, Guelph, Ontario, vice-president.

New York State Veterinary Medical Society. Annual Meeting. Hotel Statler, Buffalo, N. Y., Sept. 11-13, 1957. Joan S. Halat, 803 Varick St., Utica, N. Y., secretary.

New England Veterinary Medical Association. Twenty-third Annual Meeting. Equinax House, Manchester, Vermont, Oct. 6-9, 1957. Dr. C. Lawrence Blakely, 180 Longwood Ave., Boston, Mass., secretary.

Florida State Veterinary Medical Association. Annual Meeting. Fort Harrison Hotel, Clearwater, Fla., Oct. 13-15, 1957. Dr. Robert P. Knowles, 2101 N. W. 25th Ave., Miami 42, Fla., secretary.

(Continued on page L)

Foot-and-Mouth Disease Invades the Channel Islands

Livestock regulatory officials of USDA's Agricultural Research Service have declared the Channel Islands infected with foot-and-mouth disease, in accordance with section 306(a) of the Tariff Act of 1930. All livestock susceptible to foot-and-mouth disease, and fresh, chilled or frozen meats from such animals, are prohibited entry into the United States. Entry of certain other products and materials capable of spreading foot-and-mouth disease is also restricted.

Both hogs and cattle are affected in the outbreak. The Channel Islands had been free of this vesicular disease for several years. Islands in this group, including Alderney, Guernsey, Jersey, and Sark, belong to Great Britain.

Department records indicate that the last shipment of ruminants or swine to the United States from the Channel Islands was early in 1956.

▼ ▼ ▼

If this year's record for automobile accidents equals that for 1956, one of 70 Americans will become a statistic — a pain wracked survivor, or a name in the obituary column. A total of 40,000 Americans were killed and 2,368,000 injured on U.S. highways last year, according to The Travelers Insurance Company.

▼ ▼ ▼

If infectious agents, notably viruses, inhabit or attack only superficial body tissues, immunity resulting is relatively short. If, on the other hand, septicemia results from attack or when the infection enters the blood stream, duration of stimulated immunity of survivors is lengthened.—*James A. Baker, D.V.M.*

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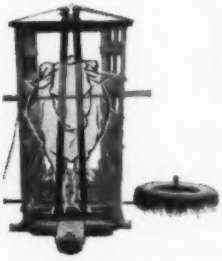

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EXAMINATIONS

Michigan State Board Examination
June 10-11, 1957

The State Board of Veterinary Examiners will hold examination for state license June 10-11, 1957, at Lansing. Examination will be written, practical, and oral. Applications are to be on file at least 15 days before examination, accompanied by $25. fee. For application blank and information, address State Veterinarian, 641 Lewis Cass Bldg., Lansing 13, Mich.

▾ ▾ ▾

Meeting Calendar

(Continued from page XLVIII)

University of Missouri. Thirty-third Annual Short Course for graduate veterinarians. Columbia, Mo., Oct. 14-15, 1957. Dr. Cecil Elder, chairman.

Eastern Iowa Veterinary Association. Forty-fourth Annual Meeting. Hotel Sheraton-Montrose, Cedar Rapids, Iowa, Oct. 17-18, 1957. Dr. F. E. Brutsman, Graer, Ia., secretary.

Southern Veterinary Medical Association. Annual Meeting. Roanoke Hotel, Roanoke, Va., Oct. 27-30, 1957. Dr. A. A. Husman, P. O. Box 91, Raleigh, N. C., secretary.

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Reduced libido
Urinary incontinence

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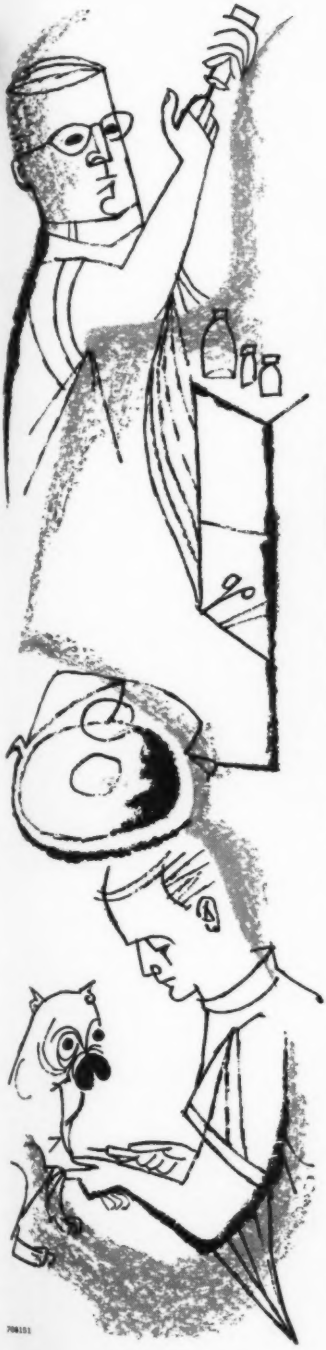

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--DEATHS OF VETERINARIANS--

Franklin Allen, Craig, Nebr., CVC '13, died recently.

L. J. Allmaras, New Rockford, N. Dak., MCK '16, 1956.

A. V. Barbee, Siloam Springs, Ark., STJ '15, died recently.

Walter Boyce, Superior, Nebr., COR '11, died recently.

Alva B. Carter, Attica, Ind., ONT '92, died recently.

Robert Chrisman, Phoenixville, Pa., UP '38, died recently.

James Coberly, Mesa, Ariz., KCV '17, died recently.

Will Coleman, Corsicana, Texas, ONT '11, died recently.

Claude Cox, Watsonville, Calif., CVC '13, died recently.

Sterling H. Creighton, Coffey, Mo., ONT '95, died recently.

James Cullison, Charleston, Mo., USC '03, died recently.

Albert L. Deal, Beach City, Ohio, ONT '00, died recently.

James E. Ellis, Boise, Idaho, KCV '03, died recently.

Arnold A. Feist, St. Paul, Minn., UP '12, Dec. 26, 1956.

R. N. Folsom, Plum City, Wisc., UP '13, Feb. 16, 1957.

William J. Freude, Dorchester, Nebr., STJ '10, died recently.

Carl Gamrath, Fairfield, Iowa, ISC '09, died recently.

W. R. Giesbrecht, Winnipeg, Man., ONT '39, Jan. 1, 1957.

R. R. Gloyd, Butler, Mo., KCV '16, died recently.

Clinton Goodwin, Pikesville, Md., USC '11, died recently.

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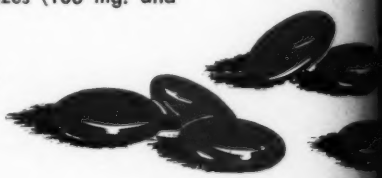

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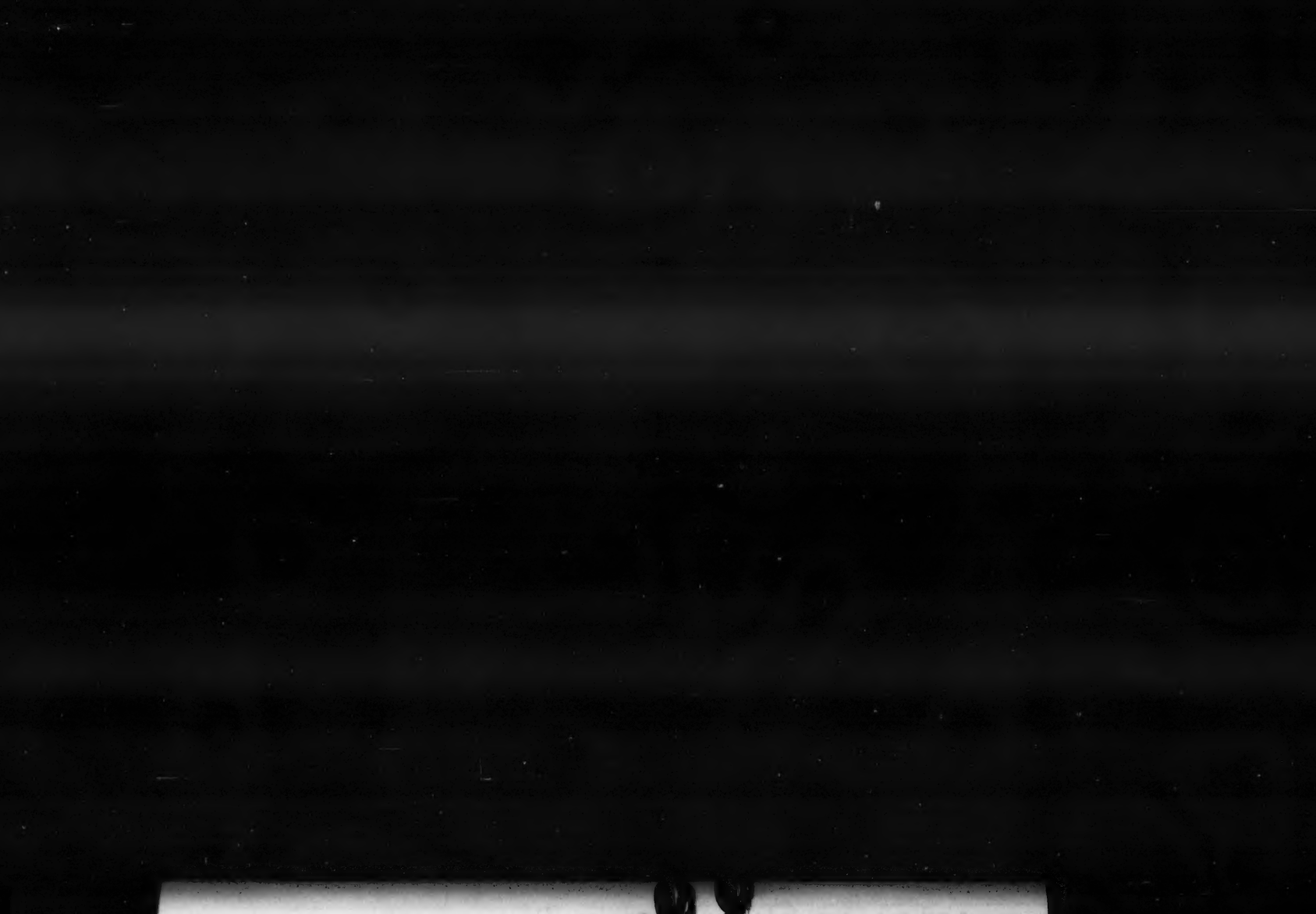

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